

August 24, 1929

A McGraw-Hill Publication

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AVIATION

The Oldest American Aeronautical Magazine



NATIONAL *Air Race* NUMBER

CLEVELAND SHOW FORECAST . . . STORY OF RACES . . .

*Secretary Davison . . . Secretary Ingalls . . . Clarence M. Young
. . . Lieut. Doolittle . . . C. S. Jones . . . Capt. Goodman-Crouch
. . . Senator Bingham . . . Commdr. Scaroni . . . B. G. Leighton*

From the Ground Up

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Is Building the Plane of Tomorrow

THE B/J organization did not grow. To design and build the new B/J plane this company has deliberately drawn together outstanding leaders in every department of aircraft design, engineering and manufacture, such men as—

HENRY A. BERLINER, Vice President, designer and builder of the Berliner helicopter and monoplane, and President of the Standard Bather Aircraft Company.

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A balanced staff of seasoned experts such as these is building the new B.J. from the ground up—up to standards that are certain to make it "The Partner of the Air." You may, indeed, expect great things of the new B.J.



AVIATION
April 26, 1929

AVIATION
April 26, 1937

THE RESULT of UNIFIED DESIGN -
THE ARGO



The Blueberry fence

buzz—*swoop*. Instantly alert to the hawk's urge—that's the *Argo*. If you desire speed, 125 miles per hour or, you can cruise at 300. And an acrobatic gosling isn't necessary for either take-off or landing.

Boris in the same place, both plane and Hess-Warner come across no survivors at the pilot's incident.

Play and social skills



THE ALLIANCE AIRCRAFT CORPORATION, *alliance*.ca



WILLIAM A. BROWN
Editor



新華書局

The definite superiority of the oleo-pneumatic principle of absorbing landing shock has been proven by the adoption of Aerol Landing Struts as standard equipment by **23** prominent manufacturers. Practically all others offer them as optional equipment. Aerol Struts are manufactured by The Cleveland Pneumatic Tool Co., Cleveland, Ohio.



See the Aerol Strut Exhibit at the National Aeronautical Exposition.

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The Glenn L. Martin
Company bids fair to be its
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Builder of Quality Aircraft since 1909
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Scintilla Aircraft
Magnetas are
standard with
Army and Navy

*They are selected because
of their*

DEPENDABILITY
SIMPLICITY
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Scintilla Aircraft Magnetas
are standard equipment on
Aircraft engines built by

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+
**Cleveland
August 24th
to
September 2nd**

Scintilla Aircraft Magnetas
can be obtained for engines of
from one to eight cylinders.

The majority of modern
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Engines are equipped
with Scintilla Magnetas.



SCINTILLA MAGNETO CO. INC.
SIDNEY - NEW YORK

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3 PLANES provide 230 hours' instruction in thirty days



BALTIMORE AIRPORT, CANTON, OHIO. Three Fairchild KR-34s at the new United Airlines, Inc., base, and ready to start instruction. There are said to be under twenty-five thousand students in the country.

DJ. BIRKETT, Jr., of Westchester Airport, believes in training students in modern ships. "The kind they will want to buy and you will want to sell," he says. And so, this summer, he switched to Fairchild KR-34s. In the first month's operation, his three regular Fairchild KR training ships had 107 hours, 48 hours and 35 hours respectively in the air. His relief instruction ship has recently been added.

"They are fine ships," says Mr. Birckett. "It is not unusual for us to use them six hours a day for instruction. They handle well. The pilots like them. The students like them. Just one little point, for example. By leaning back only slightly you can fall between the cockpits without shearing

"One great advantage for the operator in the three-place Fairchild KR-34 is that you can use these ships also for logo and taxi work. For this service, we simply remove the controls from the front cockpit and go. That doubles the value of the equipment without extra expense."

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Let us tell you the whole story of the Fairchild KR-34 and other fine airplanes at this fair. Write us for new catalog.

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KR AIRPLANES



At Pontiac ELECTRIC



Service Distributor
NATIONAL AERONAUTICAL EXPOSITION
CLEVELAND, OHIO
August 24th to September 2nd
ESPLANADE — BOOTH B-4

~~one of the doors is an LOCOMOTIVE~~

IT MOVES. At a touch of a button the door glides along the track, pushing a line of doors around the corner. It moves quietly, at an even speed, opening or closing the entrance in a mere fraction of the time required to do this job "by hand."

The new Allen & Drew Electrical Drive Unit for large installations is easily applied to any standard hangar door. It supports the door on four double flanged wheels, each of which is driven by a worm. Traction is underneath, where it should be. There are no racks, chains or cables, and no heavy upper structure to give trouble. You don't change the hangar at all. Just motorize one door for each track. It acts as an electric locomotive, moving forward or backward, pushing or pulling the doors.

Controlled by foot-press push buttons on the door itself, or by remote control located at any convenient point in hangar or office. Motorized to operate on your regular lighting or power circuit. Low operating cost.

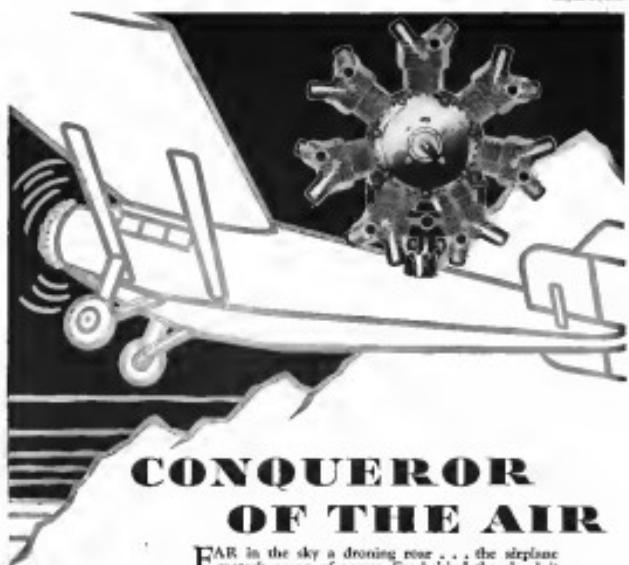
Quick opening and closing is always an advantage, especially in cold weather. One man can now handle an entire entrance, saving time, labor, and money for you.

Let us submit full information and price estimate. We can motorize your doors, no matter what type they may be!

*Open
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NO 45 BROOKFORD STREET, CAMBRIDGE, Massachusetts





CONQUEROR OF THE AIR

FAR in the sky a droning roar . . . the airplane motor's psalm of power. Far behind the clouds it soars on wings of metal, gleaming white . . . the airplane motor, conqueror of the air.

Always behind this conquest will be found an industrial organization whose skill and experience have made possible this conquest and safety in the air.

Continental Motors Corporation builds into its line of Red Seal Aircraft Engines the quality begotten of 28 years' specialized experience in designing gasoline motors, of which it is the world's largest exclusive producer.

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AERONAUTICAL DIVISION
Office and Factory: Detroit, Mich., U. S. A.



Continental Engines

AIR INVESTORS INCORPORATED

OWNING securities of 31 enterprises, the corporation gives to its stockholders a diversified investment in aviation based on sound research and analysis.

MANAGED by a Board of Directors of men outstanding in aviation and successful in other nationally known organizations, the corporation is assured of close contact with the industry combined with independence of judgement and action in the investment of its funds in new or developed enterprises.

INVESTMENTS are diversified amongst the industry's various activities including aircraft manufacturing, transport operations, airports, engine manufacturing, accessories and other allied operations. Not over 5.5% of the corporation's assets were invested in any one enterprise on July 31, 1939.

ASSETS as of July 31, 1939 exceeded \$5,000,000, without including unrealized book profit or securities owned.

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Information on the Corporation's organization, services, investments and operations may be had upon request to Harry L. Williams, President, Air Investors Incorporated, 200 Madison Avenue, New York City.

Presenting THE IMPROVED AXELSON ENGINE

Cleveland
August 24 to Sept. 2



Axelson has added marked improvements to their own cylinder radial, air-cooled engine. This improved engine will be presented at the Cleveland Show, August 24 to September 2. Judgment of its quality is left in your hands. Inspect it critically. Examine the improved features closely. Observe the simplicity. Note the economical balance and compactness of the entire engine. Simply give the engine the "third degree" of confidence.

Whether class outperforms every motor in point of power, flexibility, maneuverability and economy of gasoline and oil. Watch Axelson performance in the power and in the demonstration tests. But above all, see the Eagles at the Axelson booth. It is destined to be the talk of the Show.

Axelson Aircraft Engine Company
Los Angeles (P.O. Box 327) California



AXELSON AIRPLANE ENGINES

AVIATION
August 24, 1929



Yesterday

From the early days of aviation history Aeroplane Manufacturers have striven to outstanding merit by the skillful pursuit of events that have shaped the industry. These first efforts are but a few of the more famous historical milestones of flight.



Today

Now aviation has turned the corner. Aviation has taken to the air. Today's teamwork commands transports hour little resemblance to the pioneer planes of an earlier day.

Advances in engine design and operation have been even more rapid than changes in aircraft apparatus.

To keep pace with the march of progress, the modern aircraft must be maintained at a cruising speed of more than 100 miles per hour—must carry a pay load of 1,500 pounds or more—must function perfectly, day in, day out, in all weather conditions.

Under flying conditions place no added strain upon lubricants. Today's hard-working sun oil engines demand special lubricants to meet their exacting needs.

From the peak of the world's crude oils, Mobilgas engineers developed such an oil—Gasolene Mobil Aero II—completely correct for the job it faces alone.

High laboratory tests and the results of actual flying service prove conclusively that the New Mobilgas Aero II possesses unusual characteristics giving certain marked advantages in operation.

- Double-stage pressure washing and storage distribution of low temperature oil which holds fully and lubricating efficiency under extreme heat and cold conditions.

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- Low official price scale—less waste power.
- Low vapor point—increased oil consumption.

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Makers of high quality lubricants for all types of machinery.



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ABOUT THE COMET . . .

Design approved by U.S. Department of Commerce . . . 30 hours continuous test . . . Certificate No. 9 . . . in service more than a year on 12,000 miles of flights.

Manufactured at Madison, Wisconsin, under direction of the Gobatik Machine Company, Builders of fine machine-tools in use throughout the world.

Designing staff headed by men with long experience in Army, Navy and commercial aircraft engine development.

The Comet may be seen at Booth 116, Cleveland Air Show.

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COMET ENGINE CORPORATION
MADISON, WISCONSIN, U.S.A.



FOR THE SAFETY OF PASSENGERS

CARRYING passengers adds重量 over other methods. It removes all the paraffine wax, while preserving all the lubricating bodies in the crude. Elimination of the wax is responsible for its low cold point.

-TP-Aero Motor Lubricating Oils are now—the latest development—in scientific lubrication. They have been tested and approved by leading manufacturers of airplane engines and by many leading pilots. They are straight-run oils, not blended or compounded; produced from pure, paraffine-base crude by a process for which patents are pending.

This process has marked ad-

vantages over other methods. It removes all the paraffine wax, while preserving all the lubricating bodies in the crude. Elimination of the wax is responsible for its low cold point.

In terms of performance this means uniform viscosity at all working temperatures, maximum carbon deposits and ignition trouble from fouled spark plugs, very cold starting, immediate oil pressure, perfect lubrication winter and summer, on the ground or at high altitudes—a maximum of safe flying hours.

A handsome, practical Pilot's Log Book sent free on request.



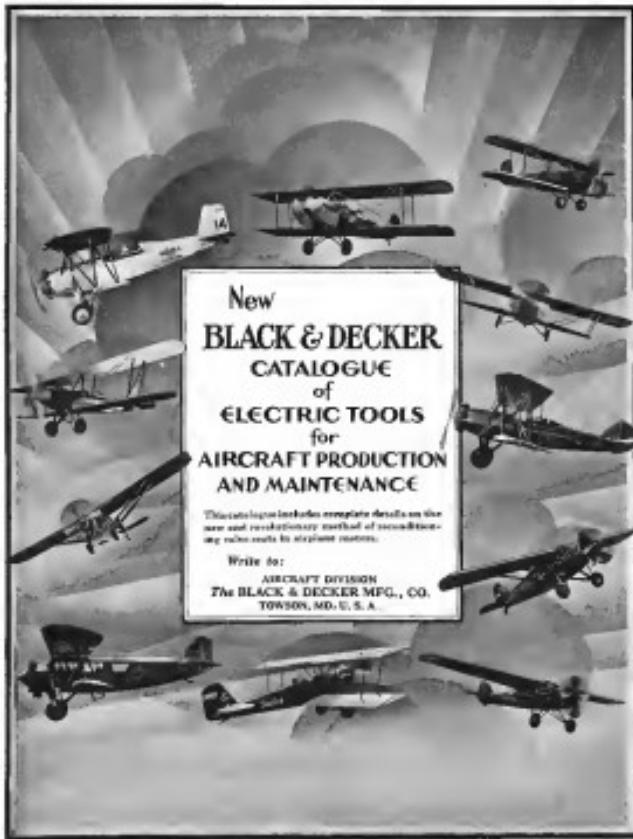
Made exclusively in Ohio
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-TP-AERO MOTOR LUBRICATING OIL



FEATURES THAT MAKE "THE FLEET" AN ECONOMICAL PURCHASE



FROM the propeller hub-out to the trailing edge of the rudder, quality is the dominant keynote of "The 1930 Model Fleet". Built to fulfill every pertinent requirement of sport and flying instruction . . . to fly with strength factors well in excess of Army, Navy and Department of Commerce requirements—"The Fleet" possesses innumerable features which are not found in the usual commercial training plane . . . reasons why "The Fleet" can truly be described as the plane which is built to a standard . . . not to meet a price. On the pages that follow you will be shown graphically a few of the unique and distinctive features that make "The Fleet" an economical purchase.

FLEET AIRCRAFT

FOURTEEN REASONS WHY "THE FLEET" IS AN ECONOMICAL PURCHASE



1 Installation of extra fuel tank for cross country flying . . . affords total fuel capacity of 50 gallons which provides 7.5 hours endurance at cruising speed.



2 Tailplane is adjustable from either cockpit while in flight. Fin is adjustable on ground.



3 The fuel tank is in upper wing . . . positive gravity feed . . . patented fuel gauge accurately records level of fuel. Tank can be drained in any flight position.



4 The engine is bolted to a patented three-point engine mount which absolutely prevents crankcase distortion.



5 Bucket-type gasoline seats are standard equipment. Rubber pads are used in place of metal footrest. Elevator is operated by push-pull rods.



6 Each cockpit provided with a safety-pad on instrument board to minimize danger of injury in accidents. Unobstructed vision and easy parachute exit are provided.



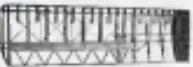
7 Welded fuselage construction . . . no tie members needed to prevent internal car strength fender requirements are exceeded in all

rods . . . alloy steel tubes welded internally and externally. For safety, Department of Commerce insistence . . . in many cases more than 300 per cent.



8 Wing cells in static test carried school load of about 7 times—nearly 50 per cent greater than Department of Commerce

9 Wings are of all-metal construction with exception of spars and struts. All spars are operated by push-pull tubes.



10 To increase bearing area in the wood and to prevent play development in service . . . every bolt securing the wing spar is surrounded by a large diameter bullet bushing. This is one of the many refinements which give "The Fleet" long life.



11 All wood parts are protected by three coats of first grade spar varnish . . . one more coat than required by the Army and Navy. This thorough protection not only prolongs the life of the plane, but makes it serviceable in all climates.



12 Whenever there is appreciable motion between joined parts, bronze bearings are employed . . . adding considerably to both the life and workability of the parts.



13 To provide a more substantial and beautiful finish . . . six coats of dope are used on all fabric parts. Ordinarily four coats of dope are considered sufficient.



14 Wing fittings and other metal parts are cadmium plated . . . a more costly process than zinc plating, but three times as effective against corrosion. Every part is painted after plating.



FLEET AIRCRAFT INCORPORATED
BUFFALO NEW YORK

RAILROADS · STEAMSHIPS · AUTOMOBILES
AND NOW
AIR TRANSPORT



THAT'S the big transportation field today. North—south—east—west—it is daily growing in importance in every progressive community. The groping, pioneer days are over. Requirements and possibilities are known and anticipated, capital is deeply interested, and freely invested. If you—or a group of your business associates—are interested in this rapidly developing field—you want full information. Facts—graphs—charts—verified figures—have been prepared to help you. They show how and why The Commodore, (various commercial prototypes of the Consolidated Patrol Flying Boat PY-1, now used by the Naval Air Service), is especially adapted to the immediate and growing needs of air transportation. The Commodore is an all-American product—all parts are standardized—an important fact in ensuring minimum maintenance. Write for data today concerning your particular transport problem.

The Commodore has an overall length of 68 feet and a wingspan of 100 feet. It is built to carry a maximum load of 10,000 pounds with passengers and baggage for 12 persons, or cargo weighing up to 150 cubic feet. Cruising range 1800 miles at 110 miles an hour.

CONSOLIDATED AIRCRAFT CORPORATION
BUFFALO, N.Y.

AVIATION
August 24, 1929

21



A THOUSAND APPLICANTS FOR FOURTEEN SEATS

SIX WEEKS before the Transcontinental Air Transport service commenced, the Pennsylvania Railroad reported having received more than a thousand applications for tickets for the first trip. In cash, this represented more than \$10,000.

Last year the flood of money poured into aviation securities proved the public's faith in the future of aviation. This year, in this way, the public has proved its faith in the present of aviation, when it is conducted by organizations that command confidence. In places the public has learned to rely on for dependable, safe, comfortable transportation.

It is a revealing portion, particularly to those operators who debate the need for further expansion of equipment at present. For it shows that the people who can afford to fly, who need the time flying saves, are ready and willing to fly. They've discarded those vague

"promises" not to fly, you encountered so often a short time ago.

It points to a very near day when your present facilities will prove far from adequate. For when a thousand people apply for fourteen seats, all signs point to the need for more seats.

Ford planes are now being built at the rate of four a week. The expansion of our manufacturing is predicated on the increasing public demand for transport flying service. It is an anticipation shared in many quarters that it is still necessary to order a Ford plane well in advance of the time it is expected to be placed in service. Plan now for the needs you must meet next spring.

THE STUDEBAKER AIRPLANE COMPANY
Division of
FORD MOTOR COMPANY
Dearborn, Michigan

Please see always welcome at the Ford Aeroplane at Detroit



THE BACH TRANSPORT AND SANTA FE'S CHIEF.**CO-VE-CO****BOTH RIDE ON PORT ORFORD CEDAR**

THIS same everlasting quality in Port Orford Cedar that has kept untreated timbers on Santa Fe roadsides for sixteen years without replacement, after exposure to nature's merciless elements...is found in the stout Bach wing!

Co-Ve-Co Plywood used by Bach and other aircraft manufacturers, is made from carefully selected Port

Orford Cedar. Cut from cold, untempered logs it retains nature's tremendous ingrained strength, and yet it is extremely light in weight! Its unwarped panels may be precision-peeled to a tolerance of .001 of an inch in sheets unmarred by even the slightest imperfection. Seal for samples, and then specify in your next order — "Co-Ve-Co" Plywood!

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A - COMPLETE - LINE - OF - AIRCRAFT - FOR - LAND - AND - SEA

The Emco-Challenger
can place aircraft training
facilities in almost any
part of the United States
because of the
Challenger's low

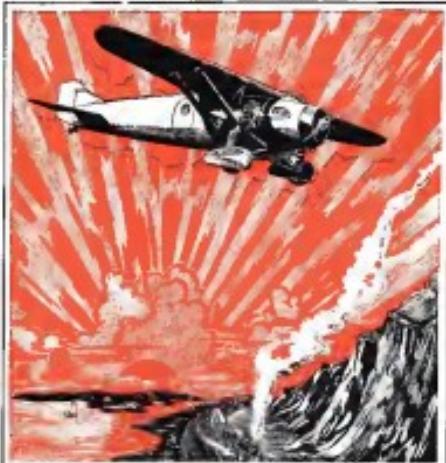
*America's
safest - most
comfortable - medium priced transport plane - the
EMSCO tri-motor CHALLENGER*

PERFORMANCE

Flight Speed 110 m.p.h. (180 km.p.h.)
Ceiling 16,000 ft. (4,877 m.)
Landing Speed 45 m.p.h. (72 km.p.h.)
Range 1,000 miles (1,600 km.)

CONSTRUCTION

Accommodations for safety in the Emco Challenger may be seen in the Emco Aircraft Corporation Headquarters at the 20th and 21st Streets, Los Angeles, California, August 10 to 12, 1939.

**EMSCO AIRCRAFT CORPORATION**

E M S C O
DOWNEY CALIFORNIA

*Emco Aircraft Corporation
Dowdy, California*

Only the finest of approved materials are used in the construction. A unique method of laminating reduces cost to minimum, and the large, unusually compartmentalized interior insures passenger comfort whether she flies in a hundred miles or a thousand.

First cost is constant with planned expansion and increasing of maintenance and operating income profit. *Configuring and pricing on request.*

STABILITY

*—the unseen pilot,
rides in every Command-Aire*



During a recent cross-country flight from the Puget-to-Lake Region in mid-June, the single-pilot aviator ordained more flying than the new Command-Aire model 125 presented with Captain Challenger 20 M.P. Miles.

THREE complete certainty you find in a COMMAND-AIRE is due to positive, abundant, unshaken superiority in the plane itself. You notice a subtle difference in the manner in which the air like the sensible stabilizer of the ship gives you a sense of feeling that a safe pilot is at the controls. And there is, for stability holds the soul in every Command-Aire.

The exclusive design of COMMAND-AIRE's slanted ailerons make it the safest plane built . . . the ship that mustn't fail, can't set out at any angle whatever . . . the only plane over which the pilot has com-

plete control at all speeds! Even should the engine stall the pilot can safely land his Command-Aire.

COMMAND-AIRE has specialized through the years to meet the demands of the leading experts in the field of aircraft prints of unusual superiority built into every COMMAND-AIRE. Aviators and mechanics are looking for safety and stability in the planes they buy and fly . . . COMMAND-AIRE supplies both to a superlative degree. May we tell you how?

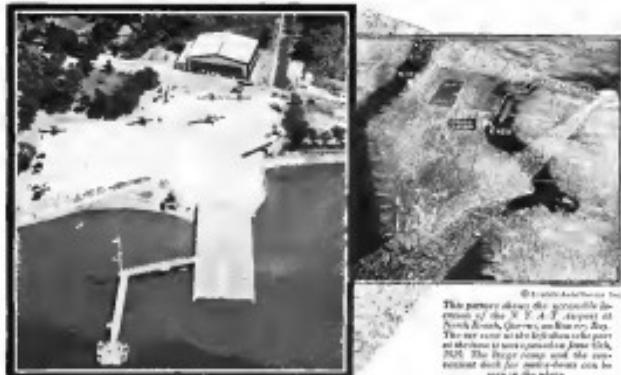
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Little Neck, New York
Telephone: TAYLOR 1-1200
Cable Address: NYAT, New York



COMMAND-AIRE



THE PLANE FOR WIDE SALES



© 1939 North Air Terminals Inc.
This picture shows the accessible location of the North Beach seaplane base at Rockaway, Queens, and its facilities. The new name will be definitely reflected in the name of the airport. From left to right: the terminal building; the convenient dock for motor-boats can be seen in the photo.

THE NYAT AIRPORT at NORTH BEACH is only 15 minutes from Manhattan now in operation for seaplanes

HOW to get in and out of New York City has been a problem for years and one of the most important of the airports for a水上 flying base, according to New York City officials. From the hours of swift river currents, changing tides, floating debris and heavy water traffic, New York Air Terminals, Inc., has selected North Beach, in the Borough of Queens, for use of its seaplane airport. Here in the quiet, protected waters of Bayview Bay, owners and operators of seaplanes will find an ideal landing place.

By now our excellent flying field of about 200 acres will also attract many visitors to North Beach.

Speed routes operating on regular schedules between the airport and East 42nd Street, Manhattan, provide quick access to the city. The nonstop time is only fifteen minutes, offering the quickest passage from any airport to Manhattan Island. There is also a convenient motor route by way of the 29th Street Bridge.

Air transport companies, air couriers and operators flying their airplanes to seaplanes, are invited to make use of this modern airport, constructed especially for their convenience. Here they will find every facility for the safe handling, storage, maintenance and inspection of aircraft. Messengers and distributors of marine aircraft will find the port ideal for distribution purposes. Write for our bulletin A-1B.



NEW YORK AIR TERMINALS

INCORPORATED

307 WEST 49TH STREET, NEW YORK

LOOKING UPWARD AND FORWARD . . .

We face the coming years with confidence, eagerness, expectation. We have the faith that has removed mountains, harnessed rivers, dug canals, erected skyscrapers—faith that is reflected by increasing thousands who look upward to new pathways of travel—faith in the belief that men of commerce see new economy, new satisfaction in transportation by air.

And this faith is the natural result of Travel Air's accomplishments. Five years of phenomenally swift growth from obscurity to leadership is Travel Air's history . . . five years of achievement . . . five years of building a reputation for dependability in Travel Air planes that is second to none in the entire field of aviation.

Dependability in every structural detail of Travel Air Number One (produced in 1924) enabled this famous plane to complete 1750 hours of flying without a single replacement. Dependability of this type

THE STANDARD OF
AIRCRAFT COMPARISON



A PLANE FOR



EVERY PURPOSE

TRAVEL AIR, WITH 17 APPROVED
TYPE CERTIFICATES, LEADS THE
INDUSTRY BY A WIDE MARGIN

won first place for Travel Air in the Ford Reliability Tour of 1926; in the Dole Race of 1927. Best of all, this dependability has developed public confidence with the result that today one-fourth of the airplanes used in America were built by Travel Air.

From an obscure Wichita workshop to a modern, fully equipped factory occupying a floor space of 16,000 square feet—such is Travel Air's splendid record of expansion. From one plane to a complete line, including twelve types that meet every transportation requirement—such is Travel Air's astonishing record of production.

Reliable business men, with or without automotive experience, are invited to write for complete information about the Travel Air Company—it's plans, its policies, and the genuine opportunity offered by the Travel Air Sales Franchise.



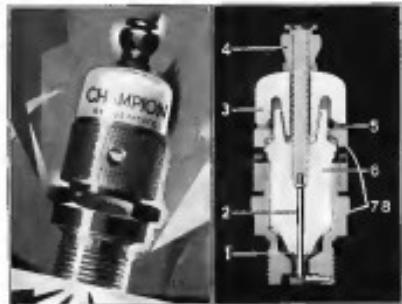
Based on the size of Travel Air there will be a constant demand for and development of new models and types of aircraft. The Travel Air Company has the ability to produce and sell airplanes of every size and type.

TRAVEL AIR COMPANY

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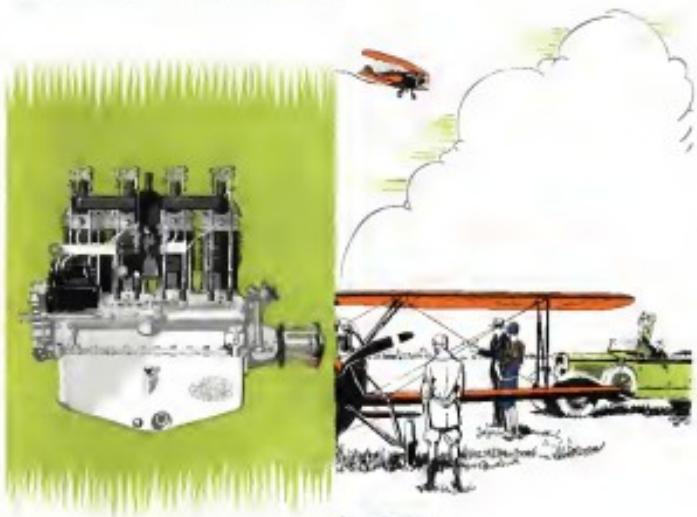
—a two-place sport training ship with a pursuit-plane example! Powered with an American Clermont 115 four-cylinder liquid-cooled engine of 95 horsepower, the Great Lakes Sport Trainer is already setting a new pace for its field.

Niles gear box drives. Tailor-made to handle. Takes off like a rocket and lands like a bit of blossoms. Ideally constructed for the training school or the private owner who wants to go places in a hurry. And the sweet-swinging ship through all sorts of weather that you have ever felt beneath you.

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The logo for Great Lakes Aircraft Corporation. It features the company name "GREAT LAKES" in large, bold, black capital letters above "CORPORATION" in a smaller, black, sans-serif font. To the right of the text is a circular graphic containing a stylized globe with green continents and blue oceans. The letter "G" from "GREAT LAKES" is positioned at the top of the circle, and the letters "LAC" are placed below the globe's horizon line.

From the rigid inspection at each successive step in the assembly of the Great Lakes Sport Trainer to the flight test of the completed ship, quality, safety and reliable service are uppermost in the mind of every man who has to do with its construction.

The fuselage, for instance, is built up of welded chrome-molybdenum stainless steel tubing, the wings of spruce and balsawood, the empennage entirely of the latter, all being fabric covered. Every piece of material that goes into the Great Lakes Sport Trainer is laboratory tested. Everything possible is provided in physical equipment, man-power and experience to produce quality airplanes on a quantity basis—that is the Great Lakes policy. Yet the price of the Sport Trainer, completely equipped, is only \$8500 fwywto Cleveland. Write for complete literature.

See the complete Great Lakes Survey exhibit at pages 4-5 and 5-6 in the *Classified Policy And Data* showing the *National & Bureau Expenditures*, August 31st or September 1st.

AVIATION

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The West American Astronomical Magazine

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JOURNAL OF CLIMATE

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A black and white photograph of a large, rugged mountain peak, likely Mount Fuji, with a small airplane flying in the foreground against a dramatic sky.

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A MEDIUM-HEAVY PAPERWEIGHT EDITION \$1.00

EDWARD P. WARREN, Editor

ISSUED . . . August 24, 1929 . . . WEEKLY



Next Week at Cleveland

HERE NEVER has been a season of transportation available to race which was not very promptly made the instrument of speed competition. From the Olympic games of ancient Greece to Charlie Paddock, from the chariot races of the Roman arena to Lexington and Saratoga and Epsom Downs, from Phoenix racing gallops and the wild races of Indian tribes in Miss Amazon VII and the Brahma, from the De Dion tricycle and the one-legged creation of Charles Duryea and Elwood Haynes to Major Sagrave's Goldfarb Arrow and the products of the Miller and Duesenberg shops, throughout the centuries the love for power speed reached among the strongest of human instincts. Men have raced with wheelbarrows; they have raced with ferry boats; and when the apostles leaped to clear the earth with an instant few bold steps, they leaped at the chance to race with apostles.

There may be differences of opinion about the precise year in which the National Air Races started, and about whether this is the seventh or the tenth repetition or something in between. There can be no doubt that post-war competition started so soon as the Army began releasing JN's for private use, within a few months after the Armistice, and it now has ten years of history behind it.

From the point of view of commercial aviation, the first six of those ten years of racing amounted to little more than leapfrogs, events, hold and speculate. They taught nothing that was not already known about the performance of military planes, for the military services had already made their own performance tests under conditions much more exact than the race tracks provided. They did, to be sure, encourage the building of specialized racing machines. They taught nothing of the commercial airplane; for commercial airplanes were few and far between. Virtually none went year after year in unopposed machines, many of them of military origin, which had been doctored up by racing competitors, minus and clipping wing areas. The

races served, as they still do, the great purpose of getting interested people together, giving them an occasion for one great social gathering, let's make little or no direct contribution to the cause of commercial flying. In fact, starting exhibitions, which have often gone along with the race meets, have probably scared off ten novice passengers for every one that has ever been attracted by them.

In the last four years there has been an enormous change, and some of those who were most sceptical in 1924 are enthusiastic about competition today. Commercial aircraft construction has come into its own, and the man-on-the-street is familiarizing the clean cut of the products. The National Air Races are more than a sporting meet giving the industry an excuse for a holiday. They are one of the industry's proving-ground-

There are many problems that arise in asking so much as the races as useful as possible. Some of them are discussed at length in articles in this issue of Aviation, and our contributors are not entirely in agreement among themselves. The question of the definition of stock model, the question of handicapping, or of efficiency competition with the scores determined by formula, the question of how amateur pilots can best be encouraged to enter in larger numbers, the question of establishing a closer relationship between the mass and actual commercial operation, all these and others demand further study and states could improve treatment.

If the National Air Races are to continue to grow in importance to the industry, they must be predominantly commercial. They must have a drawing power of their own, independent of any military pageantry. They must be planned to show the progress that has been made in developing commercial craft as well as to display pure speed, and to discourage any dangerous or foolish trade in design. Cleveland's meet, more than any of its predecessors, is of and for the commercial industry. Gag the shoulder flag for the winners!

THE National Aeronautic Association's PART

IF AIR RACES are to be of value, their management must not only be honest but also skillful and competent. Otherwise the serviceable aircraft and trained aviators would not recover the credit that they deserve. The losers would be disgruntled. Without a sound money and disinterested, the industry would derive from the competition nothing in which it could put its faith. Records would cease to have meaning. The spectators, suspicious of that sort of jealousy and treachery which has at times characterized other kinds of mass would lose interest. Racing would no longer be worthy of respectable support.

When the development of competition is left to the natural growth open in the expansion of any promoter who chooses along such a healthy or unopposed line, he need not grumble. Some records will be well made, but others will not. In order that all records may be authoritative, and that all race entries may be a source of pride to their winners, some sort of supervision by a central and national body is indispensable. Only by the activity of such an organization may we be sure of tracking, invention, creation that have sometimes been encountered in other fields, where the makers of half a dozen different types of equipment have simultaneously introduced them under the aid of federal patent offices. "Safety record" is one of the historical inaccuracies of the racing of cars; it has only been supplied by the accuracy of the length of the course upon which they are run.

Recognition of the need for a national body to interpret and to keep racing honest and trustworthy was one of the things that brought the National Aeronautic Association into being. When a group of enthusiasts met in convention at Detroit several years ago to organize the Association, they chose the first of the National Air Race meets as the occasion of their coming together. Among other things that brought about that meeting was a resolution passed by all the delegates that the time had



Eleven members of the National Aeronautic Association, left to right, are: Mr. W. E. Wright, chairman; E. P. Warren, Dr. George M. Lewis, vice-chairman; Glenn L. Martin, Under secy.; Captain William F. Millsaps, U.S.A., Comdr. Section 3, 1928-29; Mr. C. G. Verner, Mr. J. C. Verner, Mr. W. E. Wright, Mr. George W. Lewis, president; and Mr. Hiram Bingham, president of the N.A.A. in 1928-29.

come to an end the control of aeronautical sporting competition upon a haphazard and more truly national basis than had hitherto been applied to that field. Every N.A.A. convention since, with one exception, has concluded with the Air Race gathering.

About simultaneously after the first meeting at Detroit and the convening of the Association's charter, the N.A.A. received the responsibility of acting as the American representative of the Federation Aeronautique Internationale, better known as the F.A.I. For more than six years every record made in the United States has

By HON. HIRAM BINGHAM
U. S. Senator from Connecticut, President of the N.A.A.



Senator Bingham gives his reasons for feeling that the supervision of aerial contests by a central and national body is indispensable, and gives also a history of the important part that the N.A.A. has played in American aeronautical competitions and as a means of the scope of the Central Committee's present work.

passed through the Association's headquarters for certification, and so well have the observers appointed for the purpose, the expert committee, and the staff at the Washington office conducted their work that they became the subject of special commendation from the officers of the International Federation. One of more than 100 records certified from our Washington office, only one has been rejected by the International body, and only one of all the others has been valid since by any unauthorized amateur before acceptance. In neither of these cases was there any question of the veracity of the work of observer or competitor, both the rejection (of Captain Gray's soloed-Joliet altitude record) and the inclusion (of Comdrader Rodger's single distance record) being due to an official interpretation of the rules

more severe than that for which our representatives had argued.

The Association's work upon aircraft competition does not stop with the observation of attempts upon world's or American records. There is a very active contest committee, which has been instrumental in having Orville Wright as its chairman from the beginning. It is the function of this committee to keep in touch with Dr. George W. Lewis, executive officer of the National Advisory Committee for Aeronautics, as vice-chairman. All competitions in the United States must be approved and sustained by the N.A.A., acting through the Contests committee. During the first seven months of the present year sixteen contests have been applied for and granted, after securing the financial responsibility of the persons proposing the contest and the conditions under which their race would be run, and after determining that proper arrangements have been made for holding the competition fairly and that no disreputable or out-



Protocol of N.A.A. sanction for aeronautical contests

regional insurance firms of entertainment would be tolerated.

The Contest Committee also provides in a general way over the arrangements of instance of competition between actually administered by the secretary of the Committee. Capt. Louis E. Christopher at present holds that position, his predecessor having been Mr. Carl P. Selby and Mr. J. Russell Smith. The work of having steadily increased with growing interest in sporting contests of all kinds, and during the first seven months of the present year 443 sporting contests which are approved for entering into organized competition and which must be reviewed annually, have been granted by the Association.

SINCE ALL COMPETITORS in the National Air Races must secure the sporting license before taking part, the total number will no doubt be increased to 300 as more during the coming month, agree a total of 449 for the whole of last year. The holder of a license secures the privilege of entering into sanctioned competition, and the owner participate only in sanctioned competition. For flying in an unsanctioned meet he is subject to forfeiture, and his license is forfeited. In this the National Aeromotive Association has followed the procedure set by the American Aeromotive Association, which had to dash in the early days of the track and speedway racing with difficulties very similar to those that would cover aerial competition were to get out of



N.A.A. certificate required of all pilots who compete in sanctioned meets.

the hands of the aeromotoring industry and the general aircraft manufacturers and into those of insurance and advertising promoters. Against even the beginning of any such difficulty the Contest Committee, backed by the Association, has consistently stood on guard.

Another of our duties is the issuance of the F.A.I. license, which a pilot in any country can secure before he can be an entry for a competition. The license series also a very liberal framework and passport for international air sports. 215 new pilots have received their F.A.I. licenses in this country during the first seven months of the present year which brings the total for America to 7,736. A great many of that

number were of course temporary military pilots who received their "belts" during the war by simple application without the necessity of any special test.

This statistical summary gives some idea of the scope of the work that we have undertaken. Certain of our activities have gone on unchanged throughout the Association's existence, but our relations to such important competitions as the National Air Races have gradually been altered.

IN THE PAST years in which the Air Races were held, there was as little experience upon which to build that local representatives of organizations were most eager to have detailed advice and help from Washington, and for several months prior to the Race Meet the secretary of the Contest Committee would spend much of his time in the chosen city, conferring with the officials and helping them to work out and execute the plans for the meet. That has now become unnecessary because the various chapters of the N.A.A. now have contact committee of their own to properly handle the work. No longer is there the same need for direct control or participation. Race management is a profession in itself. Such men in the racing area at Cleveland are sponsored by men who have already learned the ropes and dodged the pitfalls elsewhere. The Association's function has become a supervisory one.

We have lost but one interest. It has not diminished so slightly degree. We consider competition, both local and national, as of the utmost importance, not only for the exhibitors whose products they tax but for both professional and amateur pilots. We look forward to the development of all strong as a sport as well as a business, and we are most anxious to encourage it. Anything possible will be done by this Association to stimulate events which provide interesting competition for amateur pilots as well as others designed primarily to bring out the skill and efficiency of the competing planes. These, combined with special exhibitions, the auctioning of various handicap events in the Cleveland area and the attempt to devise new and improved handicapping formulas.

I hope that we shall find the means of keeping top business as well as racing. For the Schneider Cup is being contested for this summer only a few days after the end of the Air Races. The race will be held in England, and at least three European governments expect to be on hand with full teams. I personally deeply regret that it is not possible for this country also to present three entries at the starting line with disabilities and engine impairing the last and most up-to-date thought and manufacturing skill in the American industry. At this writing I am glad to be able to state that the N.A.A. has formally entered Lieut. Alfred J. Williams as the American competitor in this race, and we are gratified for his initiative and perseverance in the endeavor to keep America in this high-speed competition.

The race for the Schneider Cup is being run in England this year, and it is only too true at best and most cases. There will again events enlarged so that it now upgrade every year or two weeks in the National Air Races Meet. The National Aeromotive Association wishes all possible success in the events which have been so evenly pleased. I urge upon every one of our members who can possibly find the means of doing so that he go to Cleveland, as a spectator in any case and as a competitor if possible.

THE NATIONAL

AIR RACES AND

Commercial Aviation

By MAJ. CLARENCE M. YOUNG
Director of Aeromotors, U.S. Department of Commerce

THE ANNUAL event in the aviation industry known as the "National Air Races" has been a constructive force in the development of civil aviation, and in promoting its use as transportation. Particularly in this year when the risks government and private investors have been forced to bring out the greatest role of design and performance either over the spectator and "circuit" phases.

An added factor which has contributed greatly is found in the combination of the event with a comprehensive civil exhibit of aircraft and engines. It affords the layman an opportunity to judge appointments and construction in detail, and to observe aerial performance and flight characteristics under test conditions.

The various individual race events which are limited to "stock jobs" usually bring out the best which a manufacturer has thus far developed for production, in a given class. He is thus compelled, for the benefit of the public, with the similar product of any other manufacturer, and the result is reflected in the annuals of a machine which is rapidly becoming more and more efficient.

The events which are limited to production aircraft—free-fall to 100' to speak—present a manufacturer is design for the requirements of the particular event and, from the experimenter general, incorporates demonstrated improvements—whether of speed or efficiency—in his



Major Clarence M. Young standing beside the Boeing 80 which flew second in the 1938 race for the importance of commerce.

fabric production line. In this respect the situation is not unlike the "Polaris Race," which called for especially designed military planes—designs which have contributed in a significant way to the present pursuit type aircraft of the Army and Navy.

It should be emphasized, however, that any series of race events, whether national or otherwise, must be conducted safely, and with every unnecessary, hazardous element removed. When they depend for their appeal to the layman upon "thrills and expected crashes," then they cause to the constructive and do much to retard the new-age enterprise of aircraft as a vehicle of transportation.

THE AIR RACES AND THE

The Heads of the Aeronautics Branches of the Army and

By HON. F. TRUHEE DAVISON
Assistant Secretary of War

ONLY TWO TYPES of Army aircraft will participate in the 1929 National Air Races and these only in two events which are closed to other Army planes flown by Army pilots.

These events are: (1) The Pursuit Plane Race for the John P. McConnell trophy; (2) The Attack Plane Race for the General Massie M. Patrick trophy. Each of these races covers a distance of 120 miles.

For the benefit of those who may wonder why the Army Air Corps does not participate in the Air Races to any greater extent, I would like to give a brief explanation of the policies that govern the Air Corps with respect to aerial contests.

It will be remembered that the Army established splendid speed records in the Pulitzer and Schneider Cups several years ago. Our participation was not so much for the purpose of entering competitively in these contests as to gather experience and material for the evolution of a speedy, well performing pursuit plane. That aim has been realized in our present day pursuit craft.

The Air Corps has not yet digested the information obtained during those racing days, and until that process of digestion is completed there is no need for the Army



HON. F. TRUHEE DAVISON

to engage in the building of aerial racing planes. It would be better in view that racing planes are extremely costly and under the limited appropriations set aside for Army Air Corps we are obliged to spend money on experimental construction which does not serve a specific military purpose.

While our participating in the general program at the National Air Races, the Army watches the performance of the various types of planes and makes with due interest, however, the lessons learned at the general contests are bound to have important bearing on the further development of military aircraft in all other competitive contests. These air races are done, as far as the development of commercial airplanes as did the early automobile races, for the advancement of the motor car in a competitive class.

The enormous progress made by the aircraft industry during the past few years and the remarkable expansion of commercial aerial activity that has taken place throughout the country have, among other things, produced many splendid types of planes that add interest and thrill to any aerial racing events. Even as the aircraft industry in the United States has advanced to its present aerial economic strength without government subsidy, so I venture to say, our National Air Races will continue to grow in importance and attractiveness without government support as a means of adding to their value.



Ferrari plane competing in 1928

National Defense

Navy Speak for Their Departments

By HON. DAVID S. INGALLS
Assistant Secretary of the Navy for Aeronautics



HON. DAVID S. INGALLS

THE RECORDS established at air races such as the National Air Races to be held at Cleveland next month are an indication of our potential strength in the air in time of war. These records tend to indicate whether or not our own aeronautical engineers are capable of producing as fast and speedy planes as those of other nations. And the question of speed is of tremendous importance in war time combat. The higher the speed of a plane, the greater chances it has to possess the upper hand in combat, extreme as war instances clearly show that the majority of planes during the war were brought down from surprise attacks by high speed planes. Our Army and Navy aviation personnel may be the best trained in the world, but unless we can furnish them with planes which are as fast and speedy as those of the enemy, they would be of little value in defense of our country in time of war. Hence, to those charged with our national defense in the air, the breaking of speed records at air races is of vital interest.

It is the winning racing plane of today that is the parent of the fast fighting machine with which our air forces will be equipped tomorrow. It is the winning racing plane that provides the necessary incentive and compensation for aeroelastic construction to design and build high speed planes which incorporate radically new features making for the reduction of resistance and so for the increase of speed by thus leading to the development and production of high speed airplanes, air forces have a definite value in the furtherance of our national defense program.

It is, of course, true that the racing airplane is not a type immediately applicable to military and naval purposes. When the primary object of racing is speed it might far surpass all others, but it is likely to suffer by neglect. For instance, racing airplanes do not possess ready and rapid response to the controls as is normally found in military or naval fighters. Again, racing airplanes are not designed to carry very heavy loads except a pilot and enough fuel to last for the short duration of the race, while Army and Navy machines must carry additional loads such as armament, radio and extra personnel. Still the changes required to convert a racing type of plane to an efficient fighting type present no great difficulty, and just experience has conclusively shown that the racing plane of the present guides the design of the service planes of the future. The rapid construction of the racing plane to military and naval types, and the use of the methods of construction in designing, reducing and holding new types of planes furnishes the possibility of any constructor building a machine for the sole purpose of saving his creation in the air. Aeroplane construction is too ex-



Ferrari team competing in 1928

AIR RACING

Technique and Tactics

By

LIEUTENANT JAMES H. Doolittle
U. S. Army Air Corps

THIS ARTICLE is to be a non-technical discussion of some of the things a pilot can do to speed up an airplane, assuming that it is designed, completed and tested over at least a few days before a race. It is further assumed that he can make no major changes in motor or airframe but can tinker with the motor, change the propeller blade setting, put an anemometer, strengthen and change the load and load distribution as he desires.

An aircraft engine is usually designed to operate best at about 90 percent of its rated power. Where it is to run continuously with open, at a race, it is sometimes possible to increase the power output by changing the torque. Usually nothing can be done with the main tuning except to be sure that the taper dimensions are correct. The ignition timing may be changed, and more power can sometimes be obtained at wide-open throttle by advancing the ignition timing about two degrees.

The selection of the proper jets for the carburetor is important. The size of the jets to be used depends greatly upon the characteristics of the individual motor and the temperature of the outside air. In cold weather jets give the best results and in the summer smaller jets.

The use of a funnel-shaped scoop to force more air into the carburetor is sometimes suggested, but I know of no noticeable case of power over 100 hp being increased in this way. In racing aerobatic biplane racers are sometimes obtained with the air intake actually pointed backwards instead of having the opening toward the front of the car. If the intake is left open and unobstructed the car will rock all the air it can. The best intake stabs provided it rocks out far enough to preclude the possibility of a lack fire forming a fire hazard, is inherently the one that causes the least resistance in flight.

When a motor slows it runs richer than when running freely. For example, if the carburetor is adjusted for perfect mixture when the airplane is on the ground and the motor revving up, with open, against the blades, it will run too lean a full throttle level flight.

It is surprising how often revolutions may be picked

Lieutenant Doolittle's prestige as a pilot is outstanding. No attempt is made to reiterate his attainments necessary. In the specific field of speed competition his most notable accomplishment has been the winning of the Schneider Race at Baltimore in 1925. Both pilots of racing planes and their designers should read with the utmost care what he has written here. It is based not only upon his long experience, but upon flight tests made for the special purposes of this article. His studies on the relation between loading and propeller pitch and speed are unusual. Those on the effect of longitudinal stability in speed are believed to be absolutely unique, and will have permanent value among technical works of reference.

up by cracking the altitude adjustment. This is especially true when flying from fields at some distance above sea level and on hot summer days. At La Par Bales, where the field is thirteen thousand five hundred feet above sea level, a Curtiss D12 engine turned up from one hundred to one hundred fifty revolutions more on the ground with the altitude adjustment wide open than with it closed. A rule of thumb to get maximum power through the use of the altitude adjustment is to set it for maximum rpm at the ground and then close it about one-eighth inch. Of course maximum revolutions are



Lieutenant J. H. Doolittle on the nose of his race airplane "Tropic Clouds" which

obtained with the altitude adjustment completely closed.

In the 1925 Pulitzer Race the late Lieutenant Cyrus Field, now a member of the Cavalry, Army Horse, noted that his 3,140 cu. in. aircraft was faster for 100 rpm more on the ground with the altitude adjustment open about one-half inch than with it closed. To allow for the slight loss in torque due to the engine running freer in flight he had a hook over eighty rods (or three eighths of an inch) and probably had the best possible carburetion. It was also noted that the start came down closer when the altitude adjustment was used, while when it was run full rich the fuelage was coated with spit from the thick exhaust smoke.

The selection of the best possible propeller for speed competition quite a problem. Ordinarily everything else being equal, a small thin-bladed propeller will give the greatest high speed, and one of large diameter and with wide blades will give the best take off and climb.

The effect on high speed is a particular case of changing the propeller pitch, shown in Figure 1 and Figure 2. The extreme manifestations of performance to a small change in the blade angle is plain.

In this case the maximum rpm occurred when the propeller was held down to 2,000 rpm. From the power curve of the motor it could be seen that it was only developed about 40% hp at 2,000 rpm. At 3,000 rpm the motor was developing about 400 hp, but the plane was about eight mph slower. This is accounted for by the fact that the propeller efficiency increases up to a certain critical point, more rapidly than the engine power falls off when the rpm are held down by increasing the propeller pitch.

Although every surplus motor-propeller combination presents a special problem it is safe to say that maximum speed will always be obtained with a pitch setting that holds the motor down to well below its maximum power output. Holding the revolutions down has the further advantage that it increases the motor and increases reliability.

It is obvious that the speed of a plane can be increased

by closing it up. The designer usually takes as effort to do just everything on the plane as is possible but sometimes, like streamlining, aerobatics, etc., it is at those points that the most good can be done. Whenever two numbers intersect there is an "intersection" which causes drag. This is especially true at zero and very low speeds. The most common forms of fairing are faired bulb wood blocks, rounded plexiglass wood, and banded aluminum. Aluminum allows both smooth start and wide end feelings give very good results. These usually take the form of the strip or wings, etc. that go along the leading edge and are held in place by small holes along their trailing edge.

For waterracing, in open-cockpit planes, is usually designed to give a maximum of protection and comfort to the occupant, so for racing should be reduced to a minimum. One reason is that enough space does not result. It is possible to cut the windscreen down so far that the drag of the pilot's head might offer more resistance than a large and steep cockpit. The closer the windscreen is to the pilot's face the smaller it may be and still afford adequate protection. The designer having the windscreen too close in the case of a crash the pilot is likely to strike his head or face on it. From the point of view of safety he should be able to lean over forward without touching windscreen, nose, or instrument board.

Altitude adjustment should be removed or streamlined. All holes should be covered over. A hole in a streamlined surface causes considerable drag. An open cockpit, for example, should be covered over, as it may truly slow the plane down as much as 5 mph.

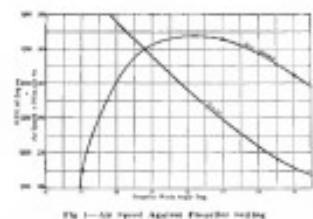
It seems reasonable to suppose that the lighter an airplane is the faster it will fly. This is not strictly true. For every altitude of an airplane a definite amount of power is required to drive it through the air at any given speed. Conversely, with a given amount of power the maximum speed can be obtained only when the altitude is in the attitude which permits it to fly through

the air current. The attitude at which an airplane flies is a function of its weight. The greater the weight the greater the angle of attack required to maintain level flight at any given speed. For a Clark Y wing section, for example, one lift occurs at an angle of attack of about minus one degree. Minimum drag occurs at about three degrees, and at this point the wing is exerting considerably lift. We would expect then that as the weight increased the angle of attack would increase since it is flying level at an angle of attack of minus three degrees. If lighter it would fly at a smaller angle of attack and it would be slower. In reality we notice that the wings only but must consider the airplane as a whole. The wings are usually put on the fuselage in such a way as to give minimum drag at cruising speed. This means that at maximum speed the tail is too high and there is considerable taildrag drag. The effect of this is to make the airplane, as a whole, fly through the air easier at a somewhat greater angle of attack than a consideration of the wing alone would indicate, and the result is that it flies faster when more heavily loaded. This also explains why an airplane can easily be sped up by pulling out the angle of attack toward the wing tips. The effect is that of decreasing the angle of incidence and thus getting the tail down and reducing taildrag drag.

Figure 3 shows the effect of gross weight on air speed for a particular case.

In this case maximum speed actually occurred when the plane was to light as it could be made, but this is not usually true and is satisfied in this case only because the airplane was of the heavy military type and already designed primarily for high speed. In a machine with light wing loading and fairly high power the maximum speed may actually be increased by carrying a little ballast.

An airplane wing, unless symmetrical in section is unstable. As the air speed increases the tendency to dive increases. In the complete airplane this is corrected and stability maintained by a down load on the horizontal



stable. With the center of gravity at 41.2 per cent of the mean chord the airplane was very unstable and tended highly to lunge over. It was obviously unnecessary to make the airplane this unstable as the curve shown that speed had actually started to fall off (Two hundred and fifty pounds of lead were put in the front of the tank in back of the engine to get the center of gravity at 41.2 per cent. It was found to have been lower with the C.G. at 15.6 per cent of the mean chord and was unable to explain why it was not. The plane was as stable with the leading conditions that it was impossible to get the tail leading conditions that it was impossible to get the tail down when banking).

In all of these tests the same airplane was used, an Avia Curtis Observation plane (OIB A.C. 29-294) mounting a Curtiss D-12 motor and an adjustable pitch propeller No. 38.198.

stabilizer. As the air speed increases the desire to dive is very large at high speeds. The greater the down load the greater the tail drag and the more it slows the airplane down. If weight is put in the tail the surprise angle of the stabilizer may be reduced. This reduces the tail drag and speeds up the plane. This can be done only where the stabilizer is adjustable, and can actually be

carried so far that the airplane will definitely become so unstable as to be uncontrollable. A very unstable plane cannot be pulled out of a steep dive, the instability making the tendency to dive greater than the controls can overcome. Another bad feature in an unstable plane is "bucking," a tendency to dive and nose over enough through the pilot's efforts to hold the plane in steady level flight. An unstable plane is very difficult to handle as the pilot is trying to hold the plane in steady level flight. The tendency is for it to circle higher and higher until it is usually necessary to pull the nose down to the deck to re-solve the problem of flying level. The more unstable the plane the more likely it is to do so and the more dangerous it is. While in South America I installed a thirty gallon gasoline tank behind the pilot's cockpit, in a Curtiss Hawk, in order to increase the cruising range. This made the plane very unstable and the first time it was permitted to go in a steep bank did a half roll end dive before it could be recovered. The same thing happened with the Verville-Sperry Racer when extra tanks were put on in 1923.

The effect of weight characteristics on air speed, where the total weight is kept constant, is shown in Figure 4. The speed is plotted against the longitudinal position of the center of gravity with respect to the mean wing chord, where this is the factor having the largest effect on longitudinal stability.

The curve shows that maximum speed was obtained at a point where the plane had just started to be un-

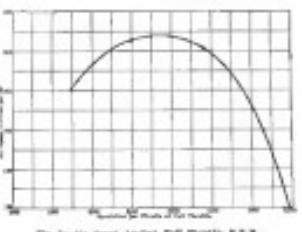


Fig. 2—Air Speed Against Center of Gravity Position.

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Operating tests have been made on the subject of turning. One of the most interesting parts of the subject of turning has been the effect of the radius of turn on the rate of turn. This has been seen making turns in instrument planes in the past six or seven years with angles of bank ranging anywhere from the vertical down to about fifteen degrees. Much depends on the angle of the turn and the shape of the course, but the general rule is that the turn should be made as sharply as possible without appreciable loss of speed. If the plane is pulled around so hard as to kill the speed badly and to make the straightforward turning considerably more slowly just when the turn was started, the maneuver was improperly executed. A sharper and a faster turn can be made by driving slightly while going around the corner, going from 50 to 100 ft of radius, than by trying to turn a long course. It was my own experience in the 1935 Seaford City Race that it was possible to enter the turns at 202 mph and finish them at 291, provided about 30 ft of radius.

In laying out the printed course to be flown an obvious object is to make the total distance covered the shortest possible. To accomplish this the pilot should cut the turns as closely as possible without actually risking disqualification, and should start the turns shortly before

reaching the pylons so that it will be symmetrical about the running-track. To put it in mathematical terms, his course should be tangent to the pylons, which should intersect the curved portion of the path. To accomplish this, it is necessary deliberately to fly wide of the pylons by an amount equal to the radius of turn of the course (likely to be about 1,000 ft for a modern racing

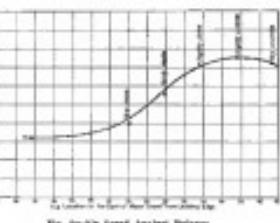


Fig. 3—Air Speed Against Turn Radius.

plane); if a 180-degree turn is to be made and by about one-third of that radius of the turn is 90 degrees. The pilot who "drives a bend" on the pyres from several miles away and then suddenly at it is using very poor judgment. If the turn is entered and left smoothly, and is made sharply enough to kill the speed, the turn will be next to an arc of a circle joining two straight lines. If the plane is pulled around too sharply, the speed will drop and the radius of curvature will decrease. These points are illustrated in Figure 5.

A pilot in flying a long straightaway should try to take advantage of the vertical wind gradient, flying as low as possible when going into the wind, and at a considerable

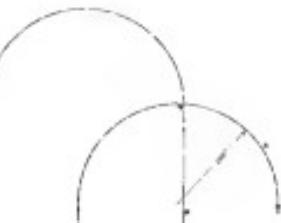


Fig. 4—Turns (a) and (b) and (c) and (d) and (e).

greater altitude when it is on his tail. A change of 500 ft. in altitude may correspond to a difference of wind speed of as much as 6 or 8 mph., and the average speed around the course may sometimes be increased by 2 or 3 mph. by this means alone.

There has been a great deal of discussion of ground effect in racing, and in a very few cases there has been an attempt to utilize it by flying within two or three feet of the surface, especially when passing over the water. The gain of speed from so doing is appreciable, particularly with a low-wing monoplane. It may be as much as 5 mph. on the straightaway, but it is at least partially canceled by the necessity of climbing for every turn. The cost of flying so low is a very fast altitude with limited visual acuity in airways, and only very rarely is the attempt worth while.

In conclusion, when racing, the following precautions should be taken to assure that the maximum speed is being obtained from the plane:

- 1 Use best altitude adjustment setting.
- 2 Set propeller blades for maximum speed.
- 3 Streamline the surface.
- 4 Carry the proper load for maximum speed.
- 5 Move the center of gravity aft as far as safety permits.
- 6 Make diving turns.
- 7 Fly well enough on the straightaways to make the turns without overshooting the turns and lengthening the course.

To illustrate further the points made by Lieutenant Doolittle's open effect of turning, a few calculations have been made. The first series are based on a triangular course with three equal legs and a turn radius determined at 30 mph. The results, which could naturally be a little faster than the average of those used in reported events in recent years, are as follows:

1. Theoretically, still turns, no loss of air-speed during turns, planform exactly hexagonal.

Turns Before Finish	Distance Around Course		Calculated Average Speed mph	Actual Average Speed
	in Feet	in Miles		
1	10,000	1.904	300.00	29.0
2	20,000	3.808	29.99	29.0
3	30,000	5.712	29.98	29.0
4	40,000	7.616	29.97	29.0
5	50,000	9.520	29.96	29.0
6	60,000	11,424	29.95	29.0

Lieutenant Doolittle's own work (N.A.C.A. Report No. 60) has shown that it is dependent on the pilot to attain even as much acceleration as six turns that do not greatly affect time without loss of vision or complete disorientation. Although the time required for a turn is only about five seconds, an acceleration of 6 g would probably be above the limit of human capacity for that time, notwithstanding the fact that the plane is theoretically capable of turning on about a 500-ft. radius; therefore, it is unlikely that a radius of less than 1000 ft. will actually be attained at 300 mph.

2. Effect of loss of speed during turns. Turning on

1,000-ft. radius, 30-mi. triangular course, turns made without loss of altitude.

Area of Turn (feet) (in English)	Average Speed Actual Course	Loss Due to Area of Turn
100	29.96	0.00
200	29.95	0.01
300	29.94	0.02
400	29.93	0.03
500	29.92	0.04
600	29.91	0.05

III. Effect of shape of course. Courses assumed to have all its sides of equal length in every case, and all turns equally sharp. Turns made on 1,000-ft. radius.

Area of Turn (feet) (in English)	Distance Actually Flown	Average Speed
2 (tri and hex)	30.00	29.97
3	30.00	29.97
4	30.00	29.97
5	30.00	29.97

IV. Effect of flying straight at pylons (as in B, Fig. 5), instead of going wide enough to make turns symmetrical about pylons.

Area of Turn (feet) (in English)	Distance Actually Flown	Average Speed	Loss Due to Turns From Pylons
2	31.07	29.97	1.35
3	30.26	29.97	0.81
4	30.00	29.97	0.00

V. Effect of climbing on the straightaway to make up for loss of altitude during a turn. Speed of 300 mph., 30-mile triangular course.

Area of Altitude in Feet Per Turn	Area of Turn (in miles)	Area of Speed Due to Climbing (in miles)
6	3.00	0.00
8	2.00	0.00
10	1.50	0.00
12	1.25	0.00

All of these effects on speed of course vary approximately inversely as the length of the course. On a 15-mile course they would all be doubled.

The total loss of average speed can be roughly decreased by adding the several components losses. Lieutenant Doolittle's losses in the Schneider Race of 1925, which he cites in his article, may be used as an example. Turns on a course of 1,000 feet on a triangular course would drop the average speed 200 mph. A climb of 2 mph. during each turn would cost another .36 mph. of the average. The necessity of climbing 50 feet on each straightaway would represent another .36 mph. With perfect turns to these specifications, at other words the total drop of the average speed below the straightaway maximum would be 300 mph. Actually, particularly in consideration of the various gains which would probably occur, another .6 mph. would be lost on the turns, another .6 mph. on flying ends of the turns, another .6 by approaching the pylons at the wrong angle, and at least .4 by deviating from the straightaway course and use of the controls. To make an average speed within 3 mph. of the straightaway maximum as an epilogued triangular course, or within .7 mph. on such a course as has generally been laid off for the Schneider Race, would be doing very well. Actually, the difference between straightaway speed and course speed for modern racing machines appears to be between 8 and 15 mph. in most cases.—E. P. W.]

A FORECAST OF THE Cleveland Show

By LESLIE E. NEVILLE

WITH THE LIST of exhibitors for above the two biennial mark, it becomes evident that the National Aircraftmen's Exposition, which opens today (August 26) in the Cleveland Municipal Auditorium, will be one of the largest assemblies of the country, if not the largest. In addition to the commercial planes at the airport, many new monoplanes of steamed and all of the allied industries will be represented.

It is expected that the crowding of exhibits mentioned at some of the previous air shows will not be characteristic of the Cleveland exposition as most of the space reservations are considerably larger than those made in previous years. An elaborate decorative scheme has been developed for the auditorium during the exposition.

A tendency toward the use of higher power at airshows to provide adequate reserves is indicated by consideration of the planes to be exhibited. This is made possible by increases in output of many of the new models of engines utilized by the various manufacturers. Another fact worthy of mention is the adoption of two former military airplanes to commercial use.

A biplane and a triplane will be available for inspection in the booth of the Armerius-Klemm Company. The biplane will be powered with a 120-hp. engine while the land plane will have the usual Stinson installation. Two other planes of this type will be available for demonstrations on the field.

The Alexander Ballot, which was exhibited for the first time at Detroit last April, will be shown at Cleveland with the Wright J-6, 165-hp. engine. J-6 and Kinner installations will also be interested to see the Boeing 80-34, a cabin biplane designed for four passengers and pilot, and powered with a Pratt & Whitney Hornet engine. This plane is useful for commercial or transport operations and has a pay load of 1,243 lb. The passenger cabin is readily convertible into a gondola or cargo compartment.

The Biarri, "drive yourself" system has been adopted by the automotive field and one of the first airplanes of the breeders' "P" class will be exhibited by the American Aircraft Manufacturing Company. The Rister powered Arrow Sport also will be shown.

Included in the exhibit of the American Eagle Aircraft Corporation will be the new Phoenix, Kinner-powered American Eagle biplane and the Wallace Triplane. Addition of the Wallace Triplane to the American Eagle has followed purchase of the Wallace company by American Eagle interests. The Phoenix

is a three-place open cockpit type of biplane having interchangeable wings and several minor departures from conventional practice.

A new model single-engine cabin monoplane known as "Wingman" will be shown by the Bellanca Aircraft Corporation. In general dimensions, design, and power plant, that model is similar to the CH-300. The major changes, however, are clearly in the landing gear and controls. The new monoplane has a wide track, landing gear fixed without Oldsmobile shock absorber struts attached to wing stabs which also provide an attachment for the forward lift struts of the plane. Controls have been carefully redesigned, levers have been changed, and a switch of pilots have been eliminated from the cockpit. The stabilizer adjustment has been redesigned and is now operated by a chain and spindles instead of the cable and drum.

THE BOEING AIRPLANE COMPANY will exhibit for the first time its new Model 80-34 high-speed single seater, sport biplane. This machine which is a commercial version of the well-known Army P-22 and Navy F-28, will be brought in to demonstrate interest in an effort to meet the demand for a high-speed single seat sport plane.

Two Argus two-place open cockpit biplanes will be exhibited in Booth No. 126 by the Allstate Aircraft Corporation. These planes are powered by the Hispano-Suiza engine which is also manufactured by the company.

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exhibit will be the St. Louis Biplane which recently established a new world's record duration record. This plane will be shown steady in a upright position while flying, the record. Other exhibits in the Curtis exhibit will be a Chicago-based Curtiss Company and a Curtiss-powered Canadian-type sport and training biplane. While these airplanes are not new, the Curtiss Challenger engine installation has been in production for a short time. At the airport, the Curtiss Knighthawk, a new type of plane still in the experimental stage, will be shown and may participate in the races.

Three of six arias which are in production will be exhibited by the Detroit Aerocraft Corp. These three planes are the Lockheed, Ryan and Eastern Flying Boats. Photographs of the all metal dirigible ZMC-3 also will be included in this exhibit.

The first of the Russo-Circus planes will be exhibited by the Russo-Aircraft Corporation. This plane is a two-place mid-wing monoplane powered with the four cylinder, air-cooled American Cirrus engine. It is a particularly well streamlined and clean design. Enlarged photographs of the unengined Russo Challenger, eight-place cabin monoplane will be shown in the booth, while the engine will be exhibited at the airport.

A new model will be brought out at the show by the Fairchild Aircraft Manufacturing Corporation. This plane is the Fairchild KB-21, a tapered wing Kinner-Bassett biplane powered with a Kinner or Warner engine. This plane is one of several developed by the Kinner-Bassett Aircraft Company, which was recently acquired by the Fairchild interests. The Fairchild 21 and the KB-21 also will be exhibited either at the show or at the airport.

In order to show the constructional details of Fleet Airplanes, the company will exhibit the skeletons of one of its planes. A completely built Fleet biplane also will be shown.

Four types of Poblen Airplanes will be on the show space in the exhibition hall and a smaller will be at



A detail view of the mounting radial engine.

the airport. This company, which is now affiliated with the General Motors Corporation, will show its F-10 and F-11 Universal Series Universal and P-13 Amphibians, all of which have been exhibited before.

Two seaplanes, the latest products of the Great Lakes Aircraft Corporation, will be shown in the company's booth. Two Trimmers, one of which will be suspended overhead on a revolving turntable in constant motion, also will be shown. Another Trainer will be used for the air race management as a "flying piano" and other planes of this type will be exhibited at various hotels and department stores in the city.

Flying activities of the E. M. Laird Airplane Company will be centered at the airport, and an indoor exhibit will be had by this company. A new Laird model, however, will be shown at the airport. This plane is the "Speedwing" biplane powered with the 300 hp Wright J-6 engine. Other Laird models also will be shown as they are at the airport.

A Wright J-2-powered Model 24-1, three place semi-closed cockpit, will be exhibited by Maryland Aircraft Inc. The closed forward cockpit of this plane is entered from the open pilot's cockpit and contains a desk, flying cabinet and other office equipment.

A Goodyear Mohr biplane will be displayed by the Mohr Aircraft Corporation, and two of these planes will be shown on the field. One of the planes on the field will be equipped with the new coupe top which converts the standard Mohr open cockpit biplane into a closed type of craft. Plans of this type for demonstration both on wheels and on pontoons also will be available.

Another interesting machine will be in the field but not at the show is the latest type of Autogiro exhibited by the Phoenix-Cirrus Autogiro Company of America. This will afford an opportunity for the many persons interested to see this unique type of aircraft.

The Wright J-6-powered Sparrow CG-3 open cockpit biplane will be shown.

The complete line of Strauss cabin monoplanes will be shown by the Thompson Aero Company of Cleveland, Ohio, distributor for Strauss.

An innovation in the form of a "turret" booth will be that of the Stanley Aircraft and Engine Co. No representative of the company will be in attendance but detailed information will be given to those who have cards or addresses. The 1929 model "Flying Dutchman" planes and the SH-2 and SH-3 engines will be shown.

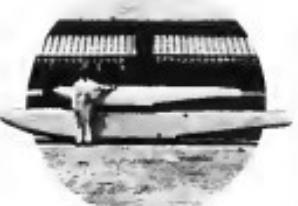
The Travel-Air Manufacturing Company will draw in space in its four and six place monoplanes. Both of these planes are powered with the Wright J-6, 300 hp. engine. The four-place plane (Model 10-B) is also offered with the "New Whittemore-Sovol" engine.

For the first time, the celebrated remote control, well-known Vought Corseal military plane, will be exhibited by the Chance-Vought Corporation, one of the units of United Aircraft. This plane, like the Boeing Model 100, has been available in the past for military purposes alone. The commercial craft will be identical with the military product as in strength features and construction details, the only change being the removal of all military equipment and substitution of equipment for private and commercial flying.

As in the case of several previous shows, airplanes in actual flying positions will be shown by the Waco Aircraft Company, formerly the Advance Aircraft Company. The new J-6 five cylinder and the new J-8 seven



Above: A side view of the new Farman "Bimot" powered by two Blériot engines and having a center of gravity located between the two engines. Below: The fastest and smallest of the new series of 60 hp standardized monoplane bi-planes.



cylinder Straight Wing model will be suspended from the ceiling at the audience while the new J-8 seven cylinder Taper Wing model will be shown in the position of a climbing turn and revolving. An innovation in the latter is a tripod type landing gear will be installed on all Waco planes.

The Hispano-Suiza Engine, which is now in production at the Allis-Chalmers factory, will be exhibited in the company booth at the show. This engine is a seven-cylinder, radial air-cooled type rated at 115 hp. It is used as standard equipment on all Allgo planes.

An exhibit consisting of one or two engines on revolving stands, and one engine with a specially designed cowling and wood propeller on a stand, is planned by American Cirrus Engines. Major parts of the engine, photographs of planes throughout the world using Cirrus engines and other features will mark the exhibit.

A complete exhibit of its latest models of seven-cylinder air-cooled radial engines will be shown by the Aeolian Aircraft Engine Company. These models embody a number of refinements. Engines of this type will be operated in a series of tests and will be entered in contests during the period of the meet.

Space 30 and 31 in the Empilements will be devoted to the exhibit of the Commercial Motors Corporation. The Model APB-1 180 hp radial engine will be shown and a plane powered with the engine will be at the airport.

Included in the engine exhibit at the Curtis Flying Service booth will be the new Crescendo, an inverted air-cooled in-line air-cooled power plant developing 110 hp. This engine is the most recent addition to the Curtis line. This is the first engine of the air cooled, inverted type to make use of ten cylinders in line.

A 225 hp, 180 rpm air-cooled engine will be shown for the first time by the Dayton Aircraft Engine Company, manufacturers of the Dayton Bear engine. Two Dayton Bear, four-cylinder-in-line, air-cooled engines also will be exhibited by this company.

Successor to the exhibit of General Air Motors Company is a five cylinder radial air-cooled engine designed by H. S. Morris and employing some departure from conventional practice. One of the unique features of this engine is the valve arrangement. Two intake and one exhaust valve per cylinder are used. A two-way intake pipe also is employed and found to be effective. A special method has been devised for clamping the aluminum head to the steel cylinder. This method makes use of a positive arrangement, employing a special clamp. A shaper type process is employed and a unique intake gas induction system is used on this engine. It is also equipped with a special altitude adjustment.

Parts and completed R-5 engines will be displayed by the Skinner Aircraft and Motor Corporation. The regular LeBlond 60 and 90 engines of the Model D series will be exhibited by the LeBlond Aircraft Engine Corporation, and a display board showing a number of engine parts also will be shown. While it is not yet definitely determined, it is expected that one of the new LeBlond 60 engines will be displayed. The engine plane is like the present LeBlond 60, except that it has cylinders with oval bores and shortened heads at 45° in larger bore, and a new type of valve operating mechanism. The engine is expected to develop a little more power and to weigh considerably less than the present model. Cylinders of the type used on the engine will also be available on the LeBlond 90, and this model will be known as the LeBlond 90.

Two engines, one a nine cylinder and the other a seven cylinder, radial, air-cooled type will be presented by the Lycoming Manufacturing Company at the show. The nine cylinder engine has a piston displacement of 665 cu. in., and a Displacement of Commerce rating of 385 hp at 2,000 rpm. The weight of the engine is approximately 102 lb. dry, or 25 lb. per rated brake horsepower. The seven cylinder engine has a displacement of 500 cu. in., and is identical in detail and design to the larger engine. As in the case of a number of the newer engine designs, the exhaust manifold is mounted between the propeller and the cylinder and is unrestricted. Ventilation has been provided between the man-

fold and the crackle to avoid undue heating. Valve seats are instances of a departure from standard practice in that they are made of "KNS".

The Pratt & Whitney Aircraft Company, which will occupy spaces 25 to 30 immediately to the right of the entrance, will exhibit four engines and parts showing their unique features. Two models of the latest type 420 hp. Series C Wasp, the direct-drive and 2 to 1 reduction geared types, will be shown. The most

mounted into a semi-housing and shown completely equipped with propeller, and electric starters.

Exhibits in the engine accessories will be the specially developed air filter for radial engines which is offered by the Air Mass Corporation.

The Bristol Aviation Corporation will be represented in the exhibits of its sub-subsidiaries: Eclipse Aviation Company, showing a complete line of starters and generators; Bendix Brake Company, displaying Bendix airplane wheels and brakes; Stromberg Motor Devices Company, Stromberg carburetor, and Serrilla Magneto Company, which will show the complete line of Serrilla airplane magneto equipment. Two different types of Serrilla magneto embodying the latest design features will be shown.

A exterior exhibit consisting of the panels and samples is offered by Harry Braden. A feature of this will be a mounted belt that hangs and performs its function in color.

Bendix castings of crankcases, cylinder heads, piston, valves, and other parts will be displayed by the John Al�amney and Brax Corporation. Castings in Bendix "X," an alloy recently developed by the company will be shown as well as a line of bearing and steel ball-belt fixed bearings for aircraft engines. A similar set of castings used in control surfaces also will be shown.

A new line of "Super-energy" aircraft engine magnatets will be displayed by the Robert Bosch Magneto Company, Inc. This line consists of the features of the Robert Bosch solenoid type magnetos. A number of new features, including electric spark control and radio shielding are embodied in these designs.

An attractive display is planned by the Chicago Screw Company, and includes a series of aircraft plates bolted and nutted, as well as numerous screw machine parts and other aircraft hardware.

A large display of shock absorbers is planned by the Cleveland Pneumatic Aerial Company. A circular stand 30 ft. in length, and showing a full line of steel shock-absorbing seats will be on display.

Accessory features of the Curtiss cabin will be a display of Curtiss fixed metal propellers and a number of wood-cased scale models of planes in the Curtiss line.

The company's booth will represent an indoor Curtiss Aerodrome, with imitation grass covering the floor and a white fence forming the barrier front.

The first formal exhibit of the two extremes of the



The Bleriot peasant biplane & Bleriot Wind Migraine

newest type of Horner engine which develops 325 hp., also will be shown at both the direct drive and geared models. An air transport exhibit of the Western Heavy Metal Company, featuring Pratt & Whitney aircraft lines, will be shown and the walls of the booth will be lined with photographs showing the various record-breaking flights powered with Pratt & Whitney engines.

One of the latest 110 hp. Sunbeam engines will be exhibited by the Warren Aircraft Corporation. Parts of the engine also will be shown.

A span approximately 70x15 feet in the main auditorium close to the main entrance will be occupied by the subsidiary of the Wright Aeronautical Corporation. This display will include one Wright Cyclone 31-1750, size cylinder radial engine rated at 525 hp.; the three engines of the J-8 series, and the Gypsy engine. A working model section of the Whirlwind Nine, cut away to show the details of internal operation and driven by a small electric motor also will be shown.

It is also planned by the company to show the famous Lawrence two-syllable engine and a collection of photographs showing Wright engines in use in various parts of the world. One of the Whirlwind nine engines will be

shown mounted in a semi-housing and shown completely equipped with propeller, and electric starters.



A photograph of the Bleriot "Peasant" showing the new landing gear design.

line of standardized airplane bows manufactured by Bilo Aircraft Corporation will be at the show. The E-1525 bows in four pieces will gross load range of 1,100 lb. to 1,350 lb., while the J-1525 bows will gross load range of 4,250 lb. to 5,100 lb.

Practically identical to the specifications of engine manufacturers and standard off-the-shelf loadings and lateral gridding qualities will constitute the exhibit of the Eu-Café Aircraft and Tool Company. The booth will be decorated in the same manner as that of the company at the Detroit show.

Booth No. 141 will be devoted to a complete line of Badois aircraft storage batteries for starting lighting, ignition, radio and other purposes. These batteries are manufactured by the Electric Storage Battery Company.

Booths 142 and 143 will house a display of

bags employed for cabin, luggage compartments, and other portions of an airplane. Detailed panels of both Hamilton and physical web canopies part of the exhibit, and other components of the Seastar Seats will be shown in place there.

Suppose a military propeller, a complete line of Miller airplane products measured as a cylinder, and a number of Johnson products such as clutches, pocket steel leg braces, split splines, commutating bars, and wheels and other apparatus will be an display by the Johnson Airplane and Supply Company. Three boats will be occupied by this concern, and a large number of aeronautical products will be shown.

Five standard types of generators in addition to the radio generator, which is a two-voltage machine will be exhibited by the Lees-Neville Company. The radio

Bleriot XI. New "Peasant" plane powered by a 110-hp. Badois aircraft storage battery exhibited by Badois Air. **Bilobowles.** Bilo's standardized type aircraft bows manufactured by the Badois Company.



generator is rated 20 amperes 15 watts, at 2,750 rpm. low voltage use; and 300 watts, 1,000 volts at 2,750 rpm. high voltage use. The voltage of these generators is regulated by the Lees-Neville patented voltage regulator.

Demonstration of aerial welding in link making and other materials, with the W-13 surface welding apparatus, will be conducted at the booth of the Linds Air Products Company. This firm and associated companies will produce an exhibit of their latest aircraft welding equipment and samples of welded materials for display purposes.

A large model of the new MarWhite Safe Lock truck will be shown by the MarWhite Company, and sample dimensions of road drawbar beams, together with photographs of planes equipped with that product also will be shown.

A controllable and reversible pitch propeller is to be the feature of the exhibit of Paragon Engineers, Inc. As a background for this display, the company is planning to show a historical group of propellers dating back as far as 1919.

Two sections have been reserved for the Parier Application Company which will show an standard line of copper and aluminum tube couplings and aerialmatic tubing in all sizes and shapes in both brass and aluminum. Included in this display will be shut-off tools, flow indicators, check valves, pressure release valves, take handles, detachable tank fittings, and nozzle valves. A gigantic catalog of a Parier Take coupling, carried out to every detail will feature the display.

A large sample board displaying the various wire products for aircraft manufactured by John A. Robbie's Sons Company will be shown. Included in these

products are aircraft wire, galvanized aircraft cord and strand in various constructions, galvanized aircraft fasteners, and thermostatic ignition cables, and power and lighting cables.

One of the latest developments of S.K.P. Industries, Inc., the S.K.P. control policy, which was recently tested at McCook field under operating conditions, will be shown. This control system has been developed which will improve to the observer the low friction qualities and the advantages of this type of policy. In addition, there will be a complete display of the various types of S.K.P. anti-friction bearings.

Adoption of the Heywood motor in many well-known engines will be shown by Sky Specialties Corporation, which recently took over the Heywood Starter Company. The new Heywood motor embodies several improvements, and is considerably lighter than the previous model.

An illumination display stand showing the valves and other equipment made by Thompson Products, Inc., will be included in the exhibit of this company. These valves have been used in many record flights and some of the success from the engines of the "City of Cleveland," "Dixie Liner," and "Anglostar" will be displayed.

INCUBUS in the airplane equipment of the Westinghouse Electric and Manufacturing Company will be a model Misura airplane, the Misura propeller, one blade, two-blade, three-blade, four-blade, five-blade, six-blade, plates for cable, fairings, bell housing, pulleys, fairleads, characters, engine, tailplane, rudder, trim tabs, landing gear.

Airplane radio equipment will be exhibited by two concerns at the show, the Radiosonic Corporation of America, and the Western Electric Company. The Radiosonic Corporation will show an aircraft transmitter, aircraft beacon receiver, and communication receiver, as well as other of their products. The aircraft communication receiver, Model AIL-308, is a new S.C.A. product designed to meet the need of transport companies for a sensitive and reliable short wave instrument for receiving from ground stations. Included in the exhibit of the Western Electric Company will be a long wave receiver for wave lengths between 880 and 1080 meters, and bearing a single dial control, wind driven generator, dynamotor, short-wave variable tuners, engine-generator, short-wave transmitter, pilot head set, and alarm wave generator transmitter.

Several oil companies have specified their intention of displaying their products at the exposition. The Associated Oil Company is planning a complete showing of its products with a pictorial story on Aviation activities on the coast, as well as displays of a different nature at the airport. An exposition display consisting principally of an illuminated sign or process board showing the method of cutting Beaufort grade, Pennsylvania crude, into its by-products, is to be offered by the Kendall Refining Company. Representatives of the Standard Company of America, will be in Booth No. 167 for the purpose of giving information about its products. This is also true of the space reserved by the Shell Petroleum Corporation. This company extends an invitation to visitors at its booth and will have the "Gold Shell," a three-engine Fokker airplane at the municipal airport during the entire exposition. An interesting exhibit is planned by the Standard Oil

Company of Ohio, which has reserved spaces No. 165, 6 and 7, in the auditorium annex. A miniature glass refinery and an exhibit demonstrating methods will constitute the same part of the exhibit. Red Cross Aviation gasoline and T-C Soles are major lubricating oils also will be shown. Representatives of the Texas Fuel Company, with its headquarters and, headed by Frank M. Blair, will study a new system of aircraft gravity loads in the construction industry. The manager expects to have 16 office quota of employees in the field to represent Texaco. The Vacuum Oil Company will display various items of machinery of its new "double stage" aircraft engine oils, Molted Aero "D" and Molted Aero "H" as well as "Mobigum" tire rocker arm lubrication.

AWARD to the nominees showing airport equipment will be the Austin Company, Gilbert and Barker Manufacturing Company, United States Air Compressor Company, and the Westinghouse Electric and Manufacturing Company. An attractive exhibit consisting of electrically operated airway maps of the United States, corrected to August 1, 1939, will be shown by Austin, as well as drawings and photographs of airports and buildings designed by the company. In Booth No. 235, Gilbert and Barker is planning to show one of its most recent products, the "Aerojet," a modern fueling system for airports. Two large used air compressor units will be shown, one for filling aircraft with compressed air and another for filling with the United States Air Compressor Company. The airport lighting equipment displayed by the Westinghouse Company will include its chronometric landing field footlight, marker light display board, Sperry type beacons, ceiling light indicators, ceiling lights, and several types of airport footlights.

INCUBUS among the audience tool manufacturers will be the Clevite Tool Company, De Walt Products Corporation, the National Arms Company and the South Bend Lathe Works. A complete line of tools used in the manufacture, maintenance and service of airplane engines, and engine equipment will be shown by the Clevite Company. The company is arranging an attractive display showing these tools in actual use, plus a model of the engine. The complete line of the De Walt Products Corporation will be shown, used extensively in the industry will be displayed. This includes the Wood Master Worker, a 5 hp. overhead drive circular metal cutting saw and the Woodie Worker, which is used for cutting wood. A new study chart, based on the use of the De Walt Woodie Master Worker in conjunction with a Bowflex Air Vice in the plant of the Travel Air Manufacturing Company has been prepared by the company. Standard and special screw machine products of aviation grade will be included in the exhibit of the National Arms Company. The company also will show its "Narco" opening broadening dies and collaring taps. The latter to be displayed by the South Bend Company will be especially adapted to work of an aeronautical nature as applied to manufacture, maintenance and repair. These tools are to be representative of the 96 sizes and types of back guard screw cutting lathes built by the company.



By BRUCE G. LEDINGTON

*Director of Sales & Service, Wright Aeronautical Corporation
Former Law Graduate, U.S.N.
Chief of Research and Technical Services
Faculty of Aeronautics*

required and power available is almost ideal. Reference is again to engine assistance and plane compression, which start bursts of speed which are thermodynamically and reduced for all practical purposes—up to the limit of human control.

Such a racing airplane, for instance, as the English Supermarine S.6, which won the Schneider cup race in 1931, gives us what may consider the perfection of speed. Its 375-hp engine weighed only 930 pounds, as against 2,000 pounds required for a water-cooled engine. The design of the ship reflected a similar arrangement. And the speed attained on a straight course, was well over 300 mph. Undoubtedly this record will never be broken, but it provides us with an ideal of speed—the possibility inherent in a "pure" airplane.

It is obviously impossible to consider the Supermarine S.6 as an available commercial airplane, or even as suitable military pursuit plane. To attain perfect design in either of these types, it is necessary to make the compromise with the pure type which we have already mentioned. And in a pursuit plane the necessity of carrying gun would lead to modifications in the fuselage, the requirement of clear vision for the pilot involves re-arrangement of the wings; safety factors for the stress of high flight must be increased; and the nose must be made larger, more robust over prolonged flights. These changes, of course, the maximum speed figure possible in the pure model.

To snare such an airplane to commercial use (we are speaking theoretically of course) even more drastic change would be necessary. Speed and rate of climb must be reduced in behalf of increased operation. Passenger comfort, controllability, and ease of maintenance must be considered. And all of these factors must result in safety and the utmost of reliability.

Yet, with all these considerations, none of the characteristics that enabled the pure type to make its high speed record in the design of the competition types.

This observation is readily removed from the realm of theory and adapted with the realm of fact. At Venice, in 1920, Louis Luigi Brangola flew a Saetta airplane powered with an Ansaldo engine 100-02 eight, to win the possession of the Schneider cup for Italy. The next year, again at Venice, the speed made by similar plane and engine was 111 mph. In 1922, Captain

Races... THE TEST-BLOCK FOR AVIATION

Harry Board of England, flying a Supermarine with a 450-hp Napier engine won the race at 145 mph.

During those three years the building of passenger airplanes for civilian use was not highly developed. But such passenger planes as were built in this country and abroad boasted top speeds of 90 and 100 mph. The factors that enabled the Schneider cup racers to attain speeds of 107, 131, and 143 mph were surely recognized by the designers of aircraft, and very quickly applied to their own work. Streamlining, and the consequent reduction of drag, was the most vital element. Reduction, engine improvements, propeller efficiency and wing design were other elements.

To point out that an ordinary production passenger plane, of standard quantity design, in 1929 naturally can attain a top speed of 140 mph is not particularly striking. But to observe that it can do this with engines of half the horsepower used in the Schneider Cup races of 1928, 1929, and 1932—that they can do it with large propellers, and yet require far fewer changes, and they can do it with wings of low loading speed, and except at relatively over prolonged speeds—these things are striking.

The first Pulitzer race was run in 1920, and won in that year by Louis C. C. Manly, who averaged 178 mph. That is a somewhat high speed, of course, even in relation to the airspeeds of 1929. But Lieutenant Manley flew in a plane designed by Verville specifically for racing purposes, and useless for anything else. It was so fragile and unsound for day use that Lieutenant William's Mercury racer is fast for this day. His engine developed 600 hp, and the very low power loading is thus perfectly obvious.

In short, the speed records of one day lead to the normal speeds of days that come after. And this is possibly safe, because of the lessons learned by designer and manufacturer from the racing courses.

THREE WHILE ACCEPTANCE of this tendency has in the ability of designers reduced the needful improvements of the aircraft, there is still room—and to increase—the speed of the aircraft. And it is possible to do this by making use of the numerous ingeneries which racing brings to the design of aircraft.

As a typical example in point, consider the metal propeller. Prior to 1925, wooden propellers had been the vague for the simple reason that they were familiar, dependable, and easy to procure. Designers of metal propellers had attempted in various ways to prove to the manufacturers that their product was more efficient. But the natural debts which surround any ship had worked to the disadvantage of the metal prop, and prevented any manufacturer from adopting it.

Then, in 1925, Lieutenant Whitten won the Pulitzer race, spending ten miles at less than that has ever since. The metal propeller had proved itself in that severe test, and the more efficient screw was adopted generally in the industry. The result of this was a palpable stopping up of maximum speeds for commercial, or passenger, craft.

The same rule holds good for numerous other details, almost as important if not quite so technical in detail and remote from the superficial view. It may be argued as a common truth in the industry that every improved race has some effect upon the manufacture of airplanes. When A wins a speed contest from B, the instant question throughout the industry is, "How did he do it?"

His airplane is examined. His influences are tested in the laboratory and on the track. If they will stand the harsh critics that will be called upon to submit to commercial aviation, they are incorporated in existing designs, or designs are altered to incorporate them.

THE RACES CURRENT at Cleveland offer even more solid assistance to the designer of commercial craft than such international events as the Schneider Cup races. For many of the planes started here are, by reason of their classification, commercial planes. To urge another mile or two of speed out of their craft and their engines, pilots are more than likely to make slight changes. It follows naturally that these changes will be submitted to further test and, if found permanently useful, incorporated in future designs.

Of course, there is some strain upon the engine in any racing plane. Above, the engine is forced to its full throttle, and called upon to stand strains that ordinarily are not placed upon it. Let us suppose that an ordinary racing pilot wishes to force his engine to a maximum for 2,000 miles—to 100,000, 200,000 rpm. The changes effected by the manufacturer for the purposes of the race are examined with new interest; if that particular engine was the race. If these changes stand up well in the race itself, and in trials and flying tests made afterwards, they are very likely to be incorporated in the stock model, thus increasing its efficiency and making it a better product.

The airplane, to whom we referred at the outset, generally address their strenuous against high speeds to the airplane and the automobile in combination. They make no distinction between the two vehicles when examining the high velocities sought by both. Of course it is their lack of intimate knowledge of aviation which prevents them from stating that there is no more danger to the passenger in flying at 200 mph than at 80, provided of course the ship is built to stand such a load. There is no place in the aircraft, however, where friction is not a factor. When an automobile at the hands of a private owner goes more than 80 mph, it becomes a dangerous vehicle for the reason that it must traverse a road, with the consequent road friction and the consequent other automobile which might be near. This would be to be considered. Designers of cars are to be considered. Irregularities on the road surface, and a momentum lag on the part of the driver would perhaps produce disastrous results.

The airplane, fortunately, is not subject to these limitations. It is quite easily controlled, even at very high speeds. These is practically no danger of collision. And nothing but a definite failure of a vital part may bring said to bear upon the occupants.

But the speed at which the airplane flies may move, by aerodynamic drag only by the ability of the airplane to fly on the race course. And it is moving, furthermore, which provides that dramatic煞笔 caused in the stimulation of man's best efforts. In a race, under that splendid human urge to surpass his fellow, a man will try things that he would not try under normal circumstances. Even if he fails, risk is the nature of flight to airplanes, the consequences are not likely to be serious. And if he succeeds, something is added to the science of mechanical flight; something that tomorrow the effects will apply quite equally as he strives to move faster than he has ever moved before, from one place to another place.



AIR RACES AND Handicapping

By CAPTAIN R. J. GOODMAN-CROUCH

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IN ALL FORMS of sport the question of handicapping is of paramount interest to the competitor, and air racing is certainly no exception to the rule.

It has, however, remained for this most masters of sports to demonstrate, as far as "split second" finishes are concerned, that good handicapping is rather an art than a science, and that the slide rule of the handicapper must be augmented by judgment based upon experience.

There are two main division into which air race handicaps fall:

Case 1. Time handicap based on speed of aircraft, the object being a close finish irrespective of individual merit of design. In this case racing skill is not taken into account, as that the actual winner should be the last pilot.

Case 2. Blindsight or formula. This is a proposal which has for some time been advanced in order to obtain recognition for aerodynamic efficiency of design, plotting being again neglected. In this case the handicap formula must be published several months before the race to afford designers a chance to meet the conditions of the formula. This method is analogous to that employed in yacht racing.

Case 1, Handicap on Speed

In my own opinion, handicap allowances based on known speed are generally preferable to those arrived at by the use of a formula, the reason being that averages of all sorts and conditions can then enter with a chance of success, and no racing is thereby rendered more popular.

"Formula" racing on the other hand involves special designing prepared and the danger of non-use in the use of a particular machine which are penalized by the formula.

Actual races may be divided into two classes, short distance races and extended circuit races.

(a) **Short Circuit Races**, i.e., races which consist of any number of laps of a small circuit. In this type of race, since of the competing machines have presumably passed over the same course and their actual performances under the identical conditions (except for weather) are known, this, of course, holds true more generally in Great Britain, where because of the small extent of the country the same plus and minus come together over

and over again at many different meetings, than in the United States.—Ed.]

The estimation of handicap allowances in such cases is simple and rapid.

Such handicaps are usually not published in the program, but are put up on the board just prior to the race. This enables an allowance to be made for the wind prevailing at the time, and also allows for the difference in starting line of the various machines when the actual race begins to be fixed at the ground.

The general method is as follows:

A tabulated form is prepared which is not only of use for showing at a glance the technical data necessary for estimating purposes, but is also of value for comparing predicted speeds in a way suitable for comparison with speeds actually attained. A suitable method of tabulation is given in Table I.

Tables I to 4 are filled up from Entry Forms submitted by the entries.

A typical example of the Entry Form used in Great Britain is shown in one of the illustrations.

The weight of aircraft empty (Column 3) is also obtained from the Entry Forms, but it is a good plan to

the case is, say, 15 m.p.h., Column 6 can easily be completed.

Column 7 can also be filled in as the day of the race, since until the wind direction is known the conditions of take-off cannot be fixed.

For instance, a half-circle of the aeronautics has to be made (because of the wind) before the machine starts its lap in the geographical sense, but allowance can be made for the extra time taken. This allowance is of particular use in short races. [It will be noted that this applies to races in which the time is taken from a standing start on the ground, and not, as in most American practice, from the crossing of the line in flight.] If the position is to be started at their heading approach, as it does in Great Britain, then the first plane across the finishing line will be the winner, the standing start must be used, for otherwise the starting time cannot be accurately controlled.—*Ed.*

Usually, assuming piloting skill to remain constant throughout, as the position is used and the machine becomes lighter than is a gradual ascent is speed, but this of course is a very small point compared with the other variables, and allowances are normally based on a constant hp speed.

This in turn allows the total time estimated to be required for the race to be filled in, in Column 7, and by subtraction the annual handicap allowance can be filled in in Column 8.

Further, if the race is due to start at a given hour, Column 9 should be filled in, and this enables the necessary adjustments to be given to the race.

Identically the handicapper's task is completed with columns 8 and 9, but in actual practice he finds from an official examination of the competing shapes before the race that differences occur between the aeroplanes themselves and their standard conditions of flight. Every form

handicap is here applied, for not infrequently, owing to losses or incomplete descriptions of power modifications and alterations to aeroplanes some action has to be taken, and it depends largely on the handicapper as to whether, in fairness to other competitors, the offending entrant is disallowed or his handicap allowance readjusted to cover the particular points in question.

Such readjustments call for a certain amount of expe-

nience, and are usually made in terms of the estimated effect of the change in m.p.h. and then translated into differences on the handicap allowances.

(b) Standard Course Race. Exactly the same methods as described above may be used for the estimated circuit races, but obviously in this case estimates for lap time need not be gone into.

In such races as the King's Cup and Aerial Derby [run over inter-city courses of several hundred miles—*Ed.*] the handicaps are published several days before the race, and it thus becomes impossible to make any definite wind allowance. For the same reason the conditions of take-off



Above: The Winner, Bert Hinkler in his machine in which he made a record flight from England to Australia. In Above dare-devotionally the first "Mark" produced

Below: An Avro 688 racing the stratosphere at English height (photo: *Inset*)



The start of a British Inter-city light plane race at Birmingham, England

can only be settled on the day the event takes place, since the direction of the wind is not known.

What, however, at first appears to be a disadvantage is really without importance, as any allowance on such a score would be quite negligible for long distance races around a closed circuit.

This form of handicapping has during the past decade produced rather interesting results, and has been widely used for inter-city and short-distance racing has become a most popular sport in America.

Air race meets have been held in various parts of the country under the auspices of the Royal Aero Club, and have been largely supported by flying clubs and private aircraft owners as Guest Hosts.

Care, II, Handicap on Formula

Up to the present the King's Cup Races of 1938 and 1939 have been the only ones run on formula handicaps in England.

The formula applied in the 1938 race was quite complex and involved the calculation of drag coefficients and propeller efficiency.

The speed obtained from the formula [$m.p.h.$] was used for handicapping purposes without any adjustment whatsoever.

It was hoped by taking into account as the formula those features which might be considered as more or less fixed for the designer, to award the prize to the owner of the ship which was deemed aerodynamically.

The results of the race showed clearly that this formula was not suitable for application to a race in which a large number of different types of craft compete.

In 1939 a much simpler formula was evolved by the Society of British Aircraft Constructors (see the corresponding herewith).

This was used in the King's Cup Race of that year, but the results tended to show that better results would have been obtained if a higher value for the constant K had been used.

It was then suggested that the correction applied in the case of air-cooled engines should be omitted, and that reengines were unduly handicapped by the adjustment of wing area for biplanes as laid down in the formula.

In 1940 the question again arose as to whether the race for the King's Cup should be handicapped on a formula basis or by personal judgment, and it was decided

at a meeting of the Royal Aero Club Committee that the latter method should be used.

From the limited experience gained up to the present time handicapping on formula has not proved a success and it remains to be seen whether a suitable formula, involving no aerodynamic assumption in its application and applicable to various and divergent types of aeroplane, can be evolved.

Personally, I am of opinion that formula handicapping will not prove of value for any race in which a large number of different types of aeroplane compete and which are offered sufficiently attractive to encourage aircraft manufacturers to design and build machines especially to beat the formula, and even in this case the fresh machine may possibly be encouraged unwittingly.

Moreover, if such a formula is evolved, I would suggest that it should set up a standard sufficiently high to allow it to be retained for a fairly long period without modification, so that by an application general design for racing may be improved from the aerodynamic viewpoint.

A Suggestion

From a consideration of the whole question and a full realization of the various difficulties which are laid up with all the issues of our race handicapping as far as it appears that in so far as sporting "close finish" races are concerned, sufficient result might be obtained by the wholehearted co-operation of the competitors.

Then if it were possible for each competing aircraft in racing conditions to be flown over an approved speed course by a pilot certified for the purpose, the results would readily eliminate all possibilities of human error as regards the personal judgment of the handicapper and similarly would go far to provide for race results by the extremely close finish which would be obtained.

It would be interesting to know whether such a scheme is practicable, but I feel that the wonderful opportunity for aviation existing today in the United States of America, coupled with the undivided admiration of the American public, affords a marvellous opportunity for us racing to get on a basis such that the finest possible results may be obtained and the interest of the great American people brought to bear on a sport which is bound to look forward to the place it justly merits within the next few years.

WHAT RACING DID FOR THE Italian INDUSTRY

THE Italian INDUSTRY

By COMMANDER SILVIO SCARONE
*Royal Italian Air Force, Air Attaché to the
Italian Embassy in Washington*



Commander Silvio Scarone

I STRONGLY BELIEVE in the advantages the races bring to the rapid technical development in aeronautics, and I am glad AVIATION asked me to say something on what racing did for the Italian industry.

But when talking about races, one has to make a distinction, as there are two entirely different kinds of racing. One consists in taking a few planes out of a military squadron, "giving them up," taking away all the unnecessary load for the size, like armament, radio, etc., putting up as far as possible the compression ratio of the engine, sometimes going off so fastening off a lot of each wing, and so on. Designers and engineers have, naturally, to stick to this kind of racing, as it is gradually done by the racers themselves to the plane set up for small repairs to the squadron's airplane.

Such races have, if my imagination at all, a purely sporting importance which does not go beyond the "prestige" of the squadron which wins the race, and serves no really useful purpose. It gives a pilot the chance to get a medal, or a squadron the chance to get a trophy.

Making available all the money a government can afford, putting together all the "engineering brains" of the nation, giving the pilots a special training, together with a good preparation in all details; that is what I call racing, even if sometimes the result is not a race in the true sense of the word, as, for instance, when it is a question of a long-distance flight, an altitude record, and so on.

To me it seems impossible to reconcile the attitude of those who are enthusiastic about spending a lot of money on all kinds of experiments in the laboratory, even for the most fantastic ends, and would at the same time deny a reasonable amount of money for racing. Of course, I am not talking here about any particular country. I have observed the same phenomenon wherever I have gone to study aviation.

What I used to take myself in the kind of "free-for-all" races" described above, and which were representative also of the international races almost until America won the Schneider Cup from England in 1923, I confess I do, too, did not believe much in racing. I could not see then the advantages of racing, since it was

generally a question not of bettering designs, but rather of saving equipment, which were, for my practical purposes.

The result was still down the technical standard, and invariably limited to a few columns in the sporting section of the newspaper, a laudatory note with a lot of "after dinner speeches" on the splendid qualities of the winner, and the tremendous future of aeronautics, and sometimes, page aside from a beautiful girl who got suddenly enthusiastic over your temporary popularity.

The comparative insignificance of those races is evidenced also by the fact that in the first years subsequent to the war the so-called "racing planes," which were purely military planes taken off the shelves left over from the war, did not increase their speed, in three years, from 1919 to 1921, by more than 10 mph.

In 1921 the speed of the planes at the Schneider Cup were in Venice, with a limit over 100 mph. (This race was cancelled because owing to the fog no competitor covered the course on time.) In 1920, the winner averaged 106.7 mph. and in 1921, De Biagioli, on a Masch 2 Flying Boat, was the racer at 110.9 mph. It is clear that from the technical point of view this kind were practically worthless.

Only the following year, England made a real improvement with a new machine and a new engine, when she passed the record up to 145.7 mph., which means a jump of 35 mph.

But England knew what that improvement cost her. It was no mere "backyard business"; it was money, study, research in a word real preparation for racing.

In 1923, Rittenhouse covered the course at an average speed of 127.30 mph., that is another 32 mph. more,



Silvio Scarone's biplane
which Scarone in 1923
won the Schneider Cup Race in
Italy with a speed of 166 mph.

but the machine was not a war machine, neither was it fitted with a war engine.

It was not the work of Squadron mechanics, but a real engineering job.

The shock of this victory was felt in Europe, and she was so little prepared for a real race that in 1926, the young Americans, Rittenhouse and the Trophy to America, the could come over to the United States, and we had no plane nor engine to compete with the Curtiss.

Curtiss, as an aeronautical contractor, was very little known to the average European, who knew about this steely in American aviation, "Liberty Engine," "Martin Bomber" and (yes, why not say it?) the "Berkling Bomber," the war of which struck his imagination.

The American plane, too, had had very little op-

portunity to show Europe what they were worth, with the result that Europe was perfectly ignorant of the quality of the aircrafts her industry there was not much worth considering in them field.

That is, of course, was long before Lindbergh, Hysler, etc., had made their single and flights across the Atlantic with their twin engines and planes.

I think to one can deny that America gained a tremendous prestige in the air when one of its citizens put up so remarkable a performance as did Rittenhouse in England. The prestige in itself may amount to little, al-

though, no matter what may be said to belittle it, it is always convertible into real money for an industry.

But the American victory at Curtis started a fire between all the aeronautic nations of the world which is still burning stronger than ever. The forcing that holds all the aeronautic world waiting for reliable news about the new planes which will participate in the Schneider Cup Race has never been to great as it is this year.

The world is anxiously waiting to see the results of the efforts made in the last two years by all the aeronautical powers of Italy, America, France, England, in a word all the great airplane-producing nations of the world with the exception of Germany.

All that interest is purely due to the races.

Now one may question the value of the technical improvements and the ability of these improvements in so far as their practical application to commercial and military aviation is concerned. [These points are unanswered by Mr. Leigh Fermor and Commander Winkler in their article, and also by Lieutenant Dawson and Lieutenant Kell.] Both these points are discussed for models, but I am writing on what racing did for the Italian industry.

Here is a poem of "old news" from an American publication written the day after Italy won the Schneider Cup. Said the "Air Corps News letter":

"The victory of the Italian flyer is all the more remarkable when consideration is taken of the fact that in the Schneider Cup Race held at Marseilles last year the Italian entry, Major Guido Bassi, in a biplane, piloted by Louis De Rittenhouse, apparently outdistanced and attained an average speed of but 166 mph. This speaks volumes for the wonderful progress made by Italy in the short space of one year in the matter of airplane developing."

But even these 166 mph. were obtained with a foreign-made engine, as at the time we had nothing home to show.

In December, 1928, the Italians were

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still looking for an engine to use in the 1938 Schneider Cup race.

Then they started thinking seriously about racing, and they obtained results to hope for which would have seemed optimistic even to an enthusiastic man.

The Italian Air Minister, H. E. Monfalcone, called together all the aeronautical "engineering brains" of Italy, and promised all the money necessary for the development of both aircraft and engines.

On Feb. 4, 1938, the engineers of the Fiat began working on the design of a new AS.3 engine, and its construction was started on Feb. 12. On June 24 the first of the first four engines in construction was successfully started.

On its part, the Macchi on March 25 began the design in detail of the airframe, and on April 13 its construction. (These figures are the official figures given by the Macchi and Fiat companies.)

In November of the same year this plane and engine won the Schneider Cup at Norfolk, Va.

In December, 1938, a very well-known American firm was asked to construct for the Italian Government the engines to be used in the Schneider Cup race. With a letter dated Jan. 6, 1939, and few answered that it should not build the engines, as the type asked had been developed in co-operation with the American Government.

Although we were far behind the leading countries in

engine construction, in about nine months, just on account of the races, we succeeded in having an engine which was considered at least one year ahead of all the engines existing at the time.

This engine had a weight of one pound per h.p., although it had a compression ratio of only 6.21, and we could therefore use ordinary fuel (diodly demanded by the Naval Air Station of Hampton Roads) in the proportion of 80 per cent gasoline and 20 per cent

ITALY people look at the plane to determine the amount of progress made in aviation, and few seem to give much importance to the engine, but it is the engine which has made the most wonderful progress, thanks to the races.

People say that such speeds will not be possible for commercial or military planes and that after all the pieces, except for an improved aeronautics, is more or less the same as it used to be years ago. And the same people tell you also that such an engine as is used in the races is too terrible and cannot stand the strain of long flights.

Well, I grant these people that the plane is still made of frosting, wings, tail and undercarriage, and that the same have left it fundamentally what it was 22 years ago. This is only to put them, nobody will deny, for instance, that the Caproni pursuit plane, which is today the

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standard equipment in the military organization, has a lot to do with other Caproni products which won the Schneider Cup at Cowes.

Again again, we will never forget the tremendous smile on the faces of several experts when for the first time they set their eyes on the Macchi plane in the hangar at Moncalieri.

In 1935 England brought to Baltimore a monoplane with non-supercharged wing of this nation, which crashed on the first trial because the wing was not strong enough to stand the strain of a 45 deg. turn. That kind of construction, said some newspapers at the time, "is criminal."

An expert whom I had the pleasure of showing around the hangar at Norfolk, posed in one hand and side rule in the other, demonstrated to me that the Macchi semi-



Macchi biplane entries entered for July 30, 1938
Schneider Cup races

biplane (a world's record which still holds good) there were incorporated all the improvements present in building the racing Fiat engine which won the Schneider Cup at Norfolk.

At the end of 1938 the whole Italian industry could not give the Government a single engine and plane for the most important international race. For this year's race, not only the Fiat, but the Isotta-Fraschini, too, have built engines which will compete; and not only the Macchi, but two other Italian firms as well, are building planes for that event.

And that the technical knowledge acquired in building these planes and engines can be exploited, at least in part, for practical use in military and commercial planes, few people can deny.

That an entirely new plane and engine, which have made a few trial flights and even won a race against the day after their race, is a remarkable achievement. Or that an engine like a racing job is such an excellent truth that no one can seriously question it. But, on the other hand, having in five years (1930-1938) brought up the speed of a plane from 110 m.p.h. to 245 m.p.h., and having brought down the average weight of the engine from ten pounds to one pound per h.p. in a real manner which can hardly be denied.

One learns it very often and the stage of technical development reached in the racing machine is already not much ahead of what we can practically apply to commercial and military planes.

One learns it very often and the amount of money needed now for the construction of new planes and new engines for that purpose is not justified by the results which may hope to obtain, either from the military or any other field.

I, for one, do not share this point of view, as I do not close in fix my heart to human possibilities. Look at all the aeronautical field.

Remembering the statement above referred to that the "Italian entry, a Macchi-Cerba monoplane, was reportedly withdrawn." It is with pride, which I believe is justified, that I read in the "London Telegraph" a recent article which says: "The Italians are determined to conquer the Schneider Cup, and since an Italian plane holds the world speed record, they are to be considered our most formidable rivals."

That is what racing did for the Italian industry.



The latest Macchi-Cerba monoplane in flight. Flown by Lieutenant De Longhi, it attained a speed of 180 m.p.h.

Nine Years OF NATIONAL AIR RACING

OF NATIONAL AIR RACING

By JAMES P. WINES

OF THE thousands of persons who are competing in witness the 1938 National Air Races at Cleveland this week, few realize the origins of the racing events or the reason for them. Even more than within the industry, the air-meets are perhaps the only event that will recall why and when and how the races were started, to supply us some growth in the last three years. Yet the history of the National Air Races is replete. Their growth marks very clearly the development of commercial aviation in this country, and it records the progress that has been made in the design and construction of aircraft and engines.

When the United States entered the War, a tremendous demand was placed upon the aircraft manufacturers. As a result, new factories were created, and they were expanded until the country had a real aircraft industry, but it was founded almost entirely upon war-time contracts—a very resourceful finding. There was no commercial aviation activity. We had a tremendous increase in the number of people entitled to 90 percent other than sales in the Government.

With the cessation of hostilities and the abrupt termination of the Government contracts, the manufacturers found themselves in an almost hopeless position. The public had accepted aviation as a military fact, but it was far from ready to accept it as something that could be used to advantage commercially. Its acceptance in this could only be brought about slowly by education.

The demand that there was for planes to be used commercially was readily supplied by the surplus of war-production machines. The year immediately following the War saw extensive use and the fact is not far from the truth of the statement who believed in the future of aviation and worked to develop it, not for the love of the game than anything else the United States would not have the aircraft industry it has today.

It was in the lesson of the last years that the National Air Races—started to encourage competition in design among the manufacturers and to arouse the interest of the public in flying—had their beginning. True, the series of races did not take its present form until 1933, when it was called the "International Air Races," much in the same manner that the first stereopticon of the Aeromotorial Chamber of Commerce in Chicago last December was known as the "International Aeronautical Exposition." But the principal event originated in the first years after the close of the War.

The Pulitzer Trophy, donated by Ralph, Herbert and Joseph Pulitzer, Jr., one of the test-pilots of the air

races, who first competed for in 1920. However, the national races may be said actually to have originated in 1925. A number of air-meet series were conducted in various parts of the country in that year, and some of the events held were later incorporated in National Air Races, where they still survive as aeronautical classics.

The greatest series of races in 1931 was to have been held at Selfridge Field, Mt. Clemens, Michigan, September 8-10. In that year it had been planned to make the second annual race for the Pulitzer Trophy. For the purpose of conducting the meet, the Detroit Aviation Society was incorporated and an elaborate program was arranged. A rain event was scheduled as



Left to right: Major C. E. Shultz, General Purchasing and Director of Public Relations, see further story at 30,000 ft. in 1938

a no-holding race for multi-engined planes with large load-carrying capacities and with high speeds in excess of 75 mph. Note that figure well, as a mark of eight years' progress in transport types. The course was to be 250 miles in length, and the rules provided that the pylons were to be passed as an altitude of not more than 400 feet, but on such lap the planes had to pass over a marker balloon 6,000 ft. in the air.

The second event was planned as a race for light-sportswear planes good for speeds of more than 80 mph. The course and the rules were the same as in the first event, but the winner was selected on a basis of points scored. Six hundred were to be given for finishing first in the race, while other points were to be given on the basis of preliminary tests for the shortest take-off and landing run and the greatest range in speed. Bonuses in points were also provided for self-starters.

runners, and the accessibility to oil, water and fuel tank caps, as well as drain plugs, flying surfaces, ignition breaker and distributor. That marked the first attempt at planning a general commercial efficiency contest.

The same rules applied to the third event scheduled, even though the winner, which was to be given, was of the observation type, having high speeds of more than 90 mph. The fourth event was the Pulitzer Trophy Race, at that time a free-for-all for planes capable of traveling at least 140 mph. That race was to have been four laps around a 40-mile closed course. For the final event, there was to have been awarded a total of \$10,000 in cash prizes.

The Detroit meet would have been one of the outstanding events of the year, but late in July the Detroit Aviation Society announced the postponement of the races until 1932 as a result of its inability to obtain assurances of Army and Navy status. The lack of funds was given as the reason for the non-participation of the services, and the men were satisfied because the service entries were being depended upon to provide competition.

However, there were events elsewhere. On September

5 there was an OX-5 powered "Jenay" race at Chicago, Illinois, with eleven entries. A flying meet held at Kokomo, Indiana, Sept. 22-24 under the auspices of the Curtis-Lindbergh Company was reported to have drawn out a total of fifty planes, most of them, no doubt, the ubiquitous JN.

The next event on the aeronautical calendar was "Aviation Day," October 16, at the then Curtis Field, Garden City, Long Island. It was distinguished by a demonstration of the advantages of air transport. The Wright Aeronautical Corporation donated a trophy for the affair, which was for both land planes and seaplanes and was extremely ambitious in its nature. Each entrant had to make a flight of his own choosing within eight



A section of Public Field, scene of the 1938 National Air Races



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hours, and then was required to cite the advantages, measured in time, money, or by any other means, of our travel over all other forms of transportation for the flight that he made. The competition presented an interesting problem for the judges.

THIS LAST JULY of 1931 was marked by two outstanding aviation meets. The first was the American Legion Flying Meet, held in conjunction with the Third Annual American Legion Convention at Kansas City, October 31 to November 2, and designed to show the progress of aviation since the close of the World War. Among the events were an altitude race, won by Lieutenant Wendell Brinkley, U. S. A., in a D.H.-4B powered with a Liberty engine. He reached an altitude of 24,850 feet with Sergeant Russell Charlton as passenger. At that time evidently no one had thought of a delayed opening parachute jump, for a parachute when Lieutenant Brinkley had reached his high altitude burst, thereby winning it up for the highest parachute jump.

Other events included an exhibition of commercial sport model planes. Incidentally, any privately owned open-cockpit plane was considered a sport model. The planes took off singly and were put through any stunts, shown an altitude of 1,000 ft., shot the plane round to perform a turn in the air, the maximum rate of climb, the safety speed of that craft. The event was won by Captain F. White, flying an SV-9A powered with a 225 h.p. SPA, and a slightly modified Indian military plane. There was also a relay race for Jessie's and "Canada," with four planes in a team. One at a time, they took off from a standing start, flew around a glass solo irregular course, landed and taxied to the line. Then the next plane of the team would take off.

"Cesey" Jones, now the president of Curtiss Flying Service, Inc., was the "Legion Junior Derby" for planes of any type with a high speed of less than 100 m.p.h. He flew his C-6 powered, Curtiss "Ornies" five laps around the 17.1 mile course at an average speed of 97.5 m.p.h. This was the first appearance of a single engine to become famous in May, 1932, as the "M. D. Jones." This was the looping contest by making 36 consecutive loops with a Lockheed biplane powered with a 60 h.p. Lawrence L-3 motor and having a reduced flap camoufage finish, while Lloyd Barrand finished first in the Legion Derby with his 400 h.p. Curtiss powered, Ansaldo Biella, at an average of 150 m.p.h. on a straightforward account. Among the other events were formation flying by Army and civilian planes, a parachute drop from a captive balloon, a standing ovation, plane changing and wing walking, an endurance race covering a minimum distance of 600 miles, and an efficiency contest for aircraft carrying five or more passengers. The latter event was intended to include engines and propeller planes. The sensational element was in the bare seats.

The second meet on the last day of 1931, and the last one of the year, was held at Omaha, Nebraska, November 3, in conjunction with the International Auto Congress. In a sense the consolidation of this event with the one at Kansas City marks the real beginning of the National Air Races. The principal issue of that affair was the second Pulitzer Trophy Race, which the Detroit Aviation Society had failed to conduct. The requirements of the race were the same as in 1930. The planes entered had to show a speed of at least 140 m.p.h., while the pilots were required to hold E. A. I. records and to be entered on the register of the Aero Club of America. However,

the course was changed slightly, to five laps of a 31-mile course. Bert Acosta piloted his Curtiss Navy racer, powered with a CD-12 engine at an average speed of 176.7 m.p.h.

Many of the planes that took part in the American Legion meet at Kansas City were flown to Omaha, where they were entered in the various other events held there. Mac Jones was again with his C-6 Ornies. He flew a Mac Jones Special, a 40 h.p. engine, and was fast for C-6 and K-6 Curtiss Ornies, Hispano-Suiza powered Jesters, Laird "Swallows," C-6 and K-6 Standards, and in general any machine with high speeds of from 75 to 90 m.p.h. in a race for Jessie's, Canada, Cox Oracles, Cox Standards, and other planes with top speeds of from 75 to 85 m.p.h. F. M. Daskalakis piloted his OK Gyro to victory by covering the 90-mile course in 49 minutes and 4 seconds.

There was also a contest at Omaha for the Larson Efficiency Trophy, which was donated by John M. Larson to reward the pilot demonstrating the highest efficiency factor (E) according to the formula:

$$E = \frac{(W - T)}{G} \cdot S$$

in which W was the total weight of the plane leaving the ground; T , the weight empty; G , fuel consumption during the flight; and S , the average speed in miles per hour made over the course. The Aero Club of Omaha had a 100 m.p.h. class and their contestants had to fly a maximum air speed of not less than 60 m.p.h., and must be able to carry a payload of 900 lbs. A minimum factor of safety of five for monoplans and four for biplanes was required. The course flown was 250 miles in length. On crossing the finish line, the planes had to climb to an altitude of 5,000 ft., maneuver by a evasive balloon, and then land in a predetermined area. This event was won from a field of 38 entries by Mr. White, with the SVA-9 in which he had captured the trophy for open planes at Kansas City. The awarding of the Larson Trophy to Mr. White, though, was later protested by the donor, who had had an entry, on the grounds that SVA-9 made use of a coarse section fuel tank, and a long and strenuous debate resulted.

THREE OTHER important occurrences affecting competitions and their management was the amalgamation in January, 1932, of the Aero Club of America and the National Air Association, which had been formed at the International Auto Congress in Omaha. This was followed in May with the announcement of plans for the formation of the present National Aeromarine Association during the week of racing to be conducted by the Detroit Aviation Society in the fall. At the time, Rear Admiral W. F. Fullerton, U. S. N. (Ret.), was making a tour of the country and went to experiment with the idea of holding the meet in the summer, which was to be known as the "M. A. A." The rear admiral was also active in the preparations for the amalgamation meeting. Incidentally, it is interesting to note that the first problem with which the Aeromarine Association planned to cope were those of controlling the race caused by the ignorance of the public in regard to flying, and the lack of legislation governing aeronautic activities.

Before the N. A. A. was formally organized, however, several important aviation meets were held. On April 29 and May 6 and 7, for example, the American Legion conducted a flying meet at Wichita Falls, Texas, the events on each of the three days being opened with a



Brown, Jr. Berlin in the cockpit of his 1938 Pulitzer Trophy winning Martin Racer

formation flight over the city. The first day, the formation flying was followed by what was known as the Curtiss 30-mile race. After this came a Semirecumbent altitude class for government planes, a shooting exhibition by Army Air Corps craft, wing walking, a race for Laird Swallows and Lexco Standards, a free-for-all aerobatic contest, and a parachute spot landing contest from an altitude of 1,200 ft. The progress for the second day was practically the same as that for the first. The third day, however, there was a free-for-all broadsheet race, a looping contest and a contest for upside down flying, in addition to parachute jumps and the formation flight over the city.

It is a long generally true throughout racing history, as it was in 1932, that the most spectacular and sensational events have been provided by the military and naval services. For example, an aviation meet was held at Logan Field, Baltimore, Maryland, Memorial Day, 1932. There was a number of civilian monos and contests, in which some 85 planes participated, yet the most interesting event from the point of view of the spectator was agreed to have been the bombing of a wood and canvas "fort" by a number of Army planes. At the National Air Races last year, likewise, the Navy's "Seafliers" and the Army's "Three Musketeers" almost monopolized the public interest except for a few brief periods.

The next event of importance in the 1932 schedule was the MacCoy, Illinois, meet, July 15-17. Thirty-five planes competed in the various events, which included several monos, an absolute contest, a parachute jumping contest to a spot landing, a fixed-wing gliding contest in which the last plane to land was set a shooting and darting contest. This meet was noteworthy for the doses of candy on certain types of aerobatics. The management announced that there would be no plane-shausing or wing walking exhibitions. Public interest in such performances was fortunately dying.

So we come to the Detroit Aviation Meet, which was opened October 7. For the first time, National Air Races were to be held on a large scale and as an unbroken whole. The meet was, of course, conducted by the Detroit Aviation Society, and was held at Selfridge Field, where it had been planned to meet the previous year. The third race for the Pulitzer Trophy was to

be held as the principal feature, with a number of others in a setting for the trophy competition.

However, it will be remembered that there had already been laid for the location of the National Aeromarine Association, among the existing aeronautic bodies. According to schedule, this organization came into being at the business meeting of the amalgamated Aero Club of America and the National Air Association, held at the time of the Detroit races. The result was that the newly formed N. A. A. picked up practically the whole group of men in a body, and when reconstituted with others in 1933 under the auspices of the St. Louis Air Board and the Flying Club of St. Louis with the service of the Aeromarine Association, they became formally known as the International Air Races.

AT any rate, six events were held at the Detroit meet of 1932. Five of them were by no means static, the sixth being devoted to civilian entries. The first event was known as the "Tammie Aerial Water Derby" and involved the race for the Curtiss Marine Flying Trophy. The class of glid had specified that the trophy should be perpetual, and that the annual race for it were to be conducted by the Aero Club of America, or any other aeronautical association assigned to the task by the Aero Club. The first race was eight laps around a 20-mile closed course, with the requirement that the planes bend and not round some water controls on the fifth, sixth and seventh laps. The necessity of making sharp turns while cutting as maximum speed produced some very spectacular results, especially with the early-day racers.

The event was won by Lieutenant A. W. Gordon, U. S. M., with his MacCoy Canard biplane powered with a 1-1 Lycoming engine, at an average speed of 122.16 m.p.h. The Curtiss Trophy race was subdivided with the entry by the N. A. A., but because it is a water event it has been conducted apart from the National Air Races.

The second event at Detroit was a race, 10 laps around a 2-mile course, for the Detroit News Auto Mail Trophy. This race was supposedly intended for air mail planes, but the popular theory about it was that all the mail planes at that time were D.H.'s, powered with Liberty engines, while the rules for the race limited the entries to large multi-engined machines. As a result, it might as well have been as Air Corps race. Four Martin bombers and a Martin transport, belonging to the Army, were the only participants. The Martin transport, piloted by Lieutenant Erik Nelsius, U. S. A., subsequently one of the members of the Army's Record-set-

World-flight, was by making good an average speed of 165.1 m.p.h. over the course. Incidentally, this was one of the earliest records gained by any aviator with the pilots' cockpit firmly enclosed.

A race for "light" commercial planes for the Aviation Country Club of Detroit Trophy was the third event. The winner was the same as in the second event, and the race was won by Lieutenant Harold H. Harris, now of Pan-AmericanGrace Airways, with the famous Liberty-powered "Hougenous Express," an extensively modified DH. The average speed made was 188.3 m.p.h. Lieutenant Harris increased his speed slightly by flying within a few miles of the coast, and it is the opinion of the part of the course that had been made to take advantage of "ground effect" in racing. The fourth event was the Liberty Engine Builders' Trophy Race for 2-passenger planes of the observation type. Nine Army machines competed, and the winner was Lieutenant T. J. Koenig with a LePere powered, of course, with a Liberty engine. The average speed maintained by the plane in the race was 126.8 m.p.h.

The third Pulitzer Trophy Race was the fifth event. It was won by Lieutenant B. L. Maughan, U. S. A., who flew the Army Curtis Na-2 to victory at an average speed of 206 m.p.h., with Lieutenant Lester J. Martindale of the Army's Macmillan flight at 197, or a difference of 9 m.p.h. The race was fly-in, with a maximum weight of 317.17 kg. 1 engine, with the Army and the Navy having bought much interest in racing and had built special machines built by a number of manufacturers, with the result that there were approximately twenty starters in the Pulitzer Race, a record never approached before or since. The sixth event was the "Onceto-Detroit" Race, the last event was the "Onceto-Detroit" Race, a free-for-all for civilian planes flying in Soildge Field from points more than 900 miles apart. It is interestingly important, because it was the beginning of the many air-mail-aeroplane air dashes now held in conjunction with the National Air Races.

St. Louis, Missouri, seems to have the faculty, so far as aeronautical events are concerned, of obtaining permission to hold the most successful at an early stage of their existence. Next winter, the second national aircrashed exposition will be held there, while in 1923 the city will be the scene of the next Pulitzer.

The 1923 air races went to St. Louis, and an organization known as the St. Louis Air Board was formed to make the arrangements and conduct the races with the aid of the Flying Club of St. Louis. To finance the event, it was proposed that a St. Louis Aeronautical Corporation be formed. Twenty thousand shares of no par value stock were to be issued and sold at \$1000 a share.

Of the capital thus obtained, it was estimated that from \$300,000 to \$500,000 would be used for the purchase of land for an airport, that \$45,000 would be expended in making permanent improvements, and that \$11,000 would be offered in prizes. The remainder of the sum was to be used for the actual expenses entailed in conducting the air races. As far as the airport was concerned, it was at Broadview, Mo., and the work on it was completed in time for the races which were set for October 3-5. At that time, the field was said to be one of the best in the country, but evidently its drainage system was not very good. The heavy rains that were experienced shortly before the races were scheduled made the field不堪

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A Boeing Model 80 ready to take off
in the 1924 Pulitzer Race

for operation, so at the last minute the races were postponed until October 4-6. Highway transport between the city of St. Louis and the field was, and remained throughout, most remiss and unsatisfactory.

The first event was the "Onceto-Detroit" race. The "Onceto-Detroit" race was the second of the "Onceto-St. Louis" event, which was conducted before the air races proper were opened. Like the Guin-Detroit Race, it was for planes flying to the Bridgeport field from a distance of more than 200 miles, and was open only to civilian fliers. The awards were made on a basis of elapsed time, taking into consideration the horsepower of the engine and the number of passengers carried in each plane. "Candy" Jones again came to the front in that race, winning it by flying his Curtis Gnat from Garden City, a distance of 900 miles, in 13 h and 20 min.

The second event of the meeting and the first event of the air races proper, was won by the Flying Club of St. Louis Trophy. It was open to civilian 2-passenger planes, powered with OX-5's or engines of lesser horsepower. The man who won the top prize around a 50 km (31.07 mi.) course of a distance of 90 miles, Walter E. Lewis, piloting an OX-5 powered Marshell P-1, was the winner, averaging 89.51 m.p.h.

The next race was for the Liberty Engine Builders' Trophy, and again it was open to civilians.

The winner was Lieut. C. McMillan, who piloted a Fokker C.6, equipped with a 90-hp. Liberty engine, six laps around the 50 km closed course at an average speed of 120.67 m.p.h.

The Duane Wright Field Trophy Race was the fourth event held at St. Louis. The rules for the race, though, had been changed since it was first conducted in Detroit. In 1923 it was a handicap for commercial planes with top speeds of at least 80 m.p.h. and with engines of not more than 750 cubic inches displacement, or approximately 200 hp. The regulations also provided that the planes entered in the race must carry at least two passengers besides the pilot. This event was won by Jack Adensen when he piloted his Bellanca CP cabin monoplane, which was powered with a 90-hp. Anzani engine, five times around the 50 km course at an average speed of 94.88 m.p.h. The characteristic Bellanca shape, with wide stabilizing struts to the wing, was unknown in this public appearance. Maintaining a speed of 114.88 m.p.h. over 300 km, was Lieut. W. Marchand's Exchange of St. Louis Trophy for Lieut. H. George, U. S. A., who flew a Martin biplane with two Liberty engines. This race had been scheduled for both military and civilian planes with carrying capacities of not less than 1000 lb. Incidentally, the winning plane was constructed originally in 1919 for the Government

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air mail work, and now carries 120,000 miles of flying in that service before it was turned over to the Air Corps and changed into a biplane.

The District Naval Air Mail Trophy Race, held for the second time, was restricted to U. S. Air Mail pilots flying regulation air mail service planes. The event was won by J. F. Mason, who flew the required six laps of the 50 km course in his DH-4 mail plane at an average of 124.68 m.p.h. The John L. Mitchell Trophy, a perpetual trophy donated by Brig. Gen. William Mitchell in honor of his brother who was lost during the war, was contested for by pilots of the Army's First Pursuit Group. It was previously "Guin-Detroit" race, and the present year was the second. Thomas Malone, MH-3's pilot, with 300 lb. weight H-3 engine, at that time, Capt. Ben Shad was the winner, flying his plane 165.45 m.p.h. The Macmillan Model Trophy, open to members of the Janes Flying League of the N. A. A., was another prize contested for for the first time at St. Louis, but the commercial participation was growing steadily more important.

WILLIAM WRIGHT FIELD, at Dayton, Ohio, was the scene of the 1924 National Air Races, which were held October 2-4, and included most of the events held at St. Louis the year before. In addition, there were some new events, planned with special reference to the interests of increasingly light and low-powered planes which had come out of glider activities in Germany and elsewhere. The first race was an "On-to-Dayton" affair, which was won by Mr. Jones, as an associate with his established belief, with a C-6 powered, clipped wing Curtis Oriole. His winning of this race was rather startling in view of the fact that he landed at Wright Field, after having flown from a point approximately 300 miles away, only to find that his flight was officially held just under the required 200-mile mark and that it could not be counted for the race. He made a nonstop trip out again, flew to Glucose Field, Broadview, Illinois, which is 205 miles from Dayton, and thus received with a good tail wind the second flight was the next day.

The second event, one of the new ones, was a race for a trophy offered by the National Cash Register Company for 2-passenger planes with engines of not more than 510 cu.in. piston displacement. Each of the entries carried a load of 340 lb. and was sent off from a starting point, making six circuits of a 12 mile closed course before finishing. This race was won by Mr. Lewis with the same Marshell P-1 that he had piloted to victory in the races the year before. His average speed was 97.5 m.p.h. This event was followed by a race for the Labor Union of Dayton Trophy, which was won by the unpredictable Mr. Jones with his clipped wing Oriole. This race was eight laps around the 12-mile closed course, and was open to all civilian planes, capable of carrying



Riders in the 1924 Pulitzer Race Readying for take off

from two to four passengers and with engines of less than 800 cu. in. piston displacement. Mr. Jones was it by flying the course at an average speed of 125 mph. Later, Dr. G. Duke, U. S. A., won the women of the Liberty Engine Builders' Trophy Race, and set a pair of 130-84 mph. with his DH. The race again to both civilian and military aircraft, and the 2-passenger class type, had been introduced, which was made legal by the additional requirement that the wing area must not exceed 100 sq. ft. The Dayton Chamber of Commerce Trophy, offered to the winner of a 150-mile closed course race for planes capable of carrying five loads of 2,000 lb. and with speeds in excess of 85 mph., was won by Capt. D. M. Myers, who set an average speed of 129.83 mph. with his Martin bomber. This race, which was almost identical with the one for the Merchant's Exchange of St. Louis Trophy in 1933, was another one of these events very effectively monopolized by the Army bombers.

The Detroit News Air Mail Trophy Race was returned as an event purely for air mail planes. The race for the Mitchell Trophy, at Alsip, was a military affair. The participants of the Curtiss 2W-6 piston planes, powered with Curtiss 125 h.p. engines, and because it was a restricted race, the participation was much smaller than competition for the Pulitzer Trophy. It was won by Capt. Cyrus Betts, who piloted his plane four times around the 30.07 mile course at an average speed of 125.85 mph. The Pulitzer Trophy event was the next on the schedule. The course and distance were the same as those for the Mitchell Trophy. Capt. H. H. Mills set an average speed of 215.72 mph. and led the events at the finish line with his Verville-Sperry, which was equipped with a 520 h.p. D-12A. It will be noticed that speed was less than that set by the winner of the 1923 race; no new machines had been built for the competition. The Pulitzer was won by the draft of Capt. Skoog, winner of the Mitchell Trophy the previous year, as the result of a structural failure while flying for the starting line. Some of the events in 1934 were divided into two



Capt. R. C. Burks, Air Corps, and his mechanic Captain Moenke, KIAF.

parts, the winners being selected on a basis of both speed and efficiency. The event with the Detroit Aviation Country Club Trophy as a prize was one of these, as was the "speed and efficiency race" for light planes, one of the newcomers. The trophies for this were donated by the Dayton Flyer Club and the Engineers Club. The speed and efficiency race, like most light plane races that were run, was a trophy contributed by the Dayton Daily News, which was probably syndicated. The engines for the planes entered in this race were limited to 80 cu. in. piston displacement, with the result that the entrants attempted to adapt themselves to conditions in these planes. Reliability under airplane conditions proved to be nil. Engine failures with these power plants were common occurrences, and some machines finished the course after a number of forced landings in fields and pastures en route. The light plane events did, however, bring out some very striking novelties in design, especially an exceedingly enclosed one monoplane designed by James Design for the Johnson Flying Service and equipped with a 1-cylinder Henderson engine.

The 1935 air races, held at Mitchel Field, L. I., N. Y., early in October, were interesting for a number of reasons. Chief among them, perhaps, was the entry of two French Army planes in the race for the Liberty Engine Builders' Trophy, giving the races an international aspect for the first time; the apparent utilization of the various events, the use of older types of planes, the grouping of the power of engines, the demonstration of the practicability of light planes when powered with suitable engines, and the separation of the military and civilian contests, so that they did not interfere in the same events.

But soon after the separation of the military and the civilian planes, the Army and Navy planes were still the center of attention as far as the spectators were concerned. In addition to 20 major events and the "Open-to-New-York" Race, there was a sharp battle between National Guard planes and Army tasks, a balloon hunting arm, an aerial circus, a three-air battle, parachute jumps, aerial acrobatics, sky writing, bombing runs and radio broadcasting from the air. The National Air Races continued to wear the colors of a military pageant. It is interesting to note, also, that there was a demonstration of whether a plane can fly. There were, however, a number of delayed opening parachute jumps, which were an attempt to break the then-existing record of 1,800 feet. In connection upon the races in general, Atterbury said that "We have planes made a brave showing in the background of military planes." Military control was strict, and there was much dissatisfaction both among spectators and civilian competitors over the field rules and their enforcement. In fact, the last year before the taking off of the Air Commerce Act, marked also the loss holding of the National Air Races on a military field.

The Costa New York Race for the New York Chapter of the N. A. A. Trophy was limited to civilian planes, and the mere means of choosing the winner was used in this as in the earlier events of this type, except that the rules gave the pilot covering a very long distance at moderate speed a better chance than in the previous year. The race was won by Kenneth W. Marne, who flew his OX-5 powered "Mooris Special," a legatee of his two contractors, Leon Sante Morris, Capt. T. J. Mitchell Field. The first event on the air race program



Entry in the "Monocoupe Exchange Trophy Race" in the 1935 National Air Races.

proper was a free-for-all for the Glenn H. Curtiss Trophée, for the two largest planes with engines of 320 cu. in. piston displacement or less. Each plane was required to carry a load of 500 lb. The race, which was 20 laps around a 5-mile closed course and was open to civilians only, was won by Capt. L. Hause, who flew a Thomas-Morse 54AE equipped with an Aeromarine engine, averaging 152.9 mph.

Mr. Jones, with his record-breaking clipped-wing Osprey won the second event and the trophy offered by the Merchant's Association of New York, when he taxied 20 miles around the 5-mile course at an average speed of 134.2 mph. Like the first event, this race was a free-for-all for civilian planes. The piston displacement limit was 800 cu. in. and the planes, which were all capable of carrying from two to four passengers, carried dead loads of 340 lb., supposed to be the equivalent in weight to two persons. The N. A. A. specifically requested that dead weight be carried by the racing planes in place of passengers.

The third event was the Liberty Engine Builders' Trophy Race, who however relied a military race, was also limited to planes of the two-passenger observation type, possessing top speeds of at least 30 mph., and with more than 200 sq. ft. of wing area. The race was 41.65 laps around a 1.6-mile closed course. As has been said before, this event was featured by the entry of two French Army planes. Both Biplane XIAs had powered with different engines were placed in the race. In fact, Capt. Henri Louwrier, who piloted the 455 h.p. Renault-engined Biplane, was the winner, with an average speed of 125 mph. His colleague, Capt. G. Pichot d'Orly, whose long-distance flights had made him the darling of the French public and whose plane was equipped with a Lorraine 325 h.p. engine, came in fourth.

THE NAME OF THE AVIATION COUNTRY CLUB OF DETROIT Trophy was changed in 1932 to the Aviation, Town and Country Club of Detroit Trophy, but the winner of the prize was chosen in the same manner as before. The event was for civilian planes only, with top speeds of at least 80 mph., and with engines of not more than 800 cu. in. displacement. They were required to carry a pilot and two passengers, each weighing at least 170 lb., or a 360 lb. load. The race was 20 laps around a 5-mile course, and the winner was adjudged on a basis of speed and also an efficiency determined by the product of speed and contest load carried per horsepower.

In spite of the poor showing made by the monoplane single-light planes the year before, the races in 1935 included the two-light plane events originated at Dayton. The first one, for the Dayton Daily News Trophy, was governed by essentially the same rules as before. The event was limited to planes with engines of not more than 80 cu. in. piston displacement, while the pilot was required to weigh 125 lbs. In the event that they weighed less than 150 lbs., the plane was to carry sufficient ballast to make up for his deficiency. It resulted one strongly of a horse race. The race, of course, was for civilians and was flown ten laps around a 5-mile course with a check to an altitude of 500 ft. in one site on each circuit of the course. The regulation of the N. A. A. in regard to the planes entered in this race is interesting.

"General conditions and design of plane to be such that, in the opinion of the contest committee, it is safe and not a hazard to other contestants," and the rules evolved by the N.A.A. "The contest committee may inquire a demonstration flight with racing maneuvers from any plane where safety it considers questionable. The



P. E. BARTSCH, winner of the "Bartel Trophy" race in 1928.

contest committee reserves the right to refuse to admit any airplane which does not comply with these requirements."

All the contests in the Dayton "Daily News" Trophy Race and the speed and efficiency race for light planes, which was for the "Scientific American Trophy" in 1928, were powered with multi-cylinder engines except for the "Pawnee Racer" built by Paul C. H. Powell of the University of Detroit and a group of his students. The little machine was a real racing job with a high wing loading. It had a broad "Clouds" designed especially for airplane work as its power plant, and completed its conception. Piloted by Tracy V. Duck, it won both events. In the first race, the plane maintained an average speed of 71.16 mph, while in the second its speed was only a shade less. The claim of the racers in the second race were the same, the first, but the winner was selected upon a basis of both speed and efficiency.

Efficiency was determined by means of the formula

Speed of completing race in mi./hr.
Ground Covered

It was seen as almost inevitable that difficulties, delays and disputes have marred whatever it has been necessary to measure fuel consumption to determine the winner of a competition.

The Mitchell Trophy was flown ten laps around a 12-mi. course. As a result of the short course, the speed was disappointing. First, Lieut. T. K. Marbeau, who piloted a Curtiss PNB-B powered with a D-12 engine, a plane of the same type that won the after-the-year-be-

fore, was the winner. However, his average speed was only 161.5 mph. The Pulitzer race, the racing event, was four times around a 50 km. course with a very sharp turn at one of the pylons. The race was captained by the late Lima Cyrus Bettis, flying a Curtiss Army Racer equipped with a Curtiss V-1600 engine, at an average speed of 241.659 mph., a new world's record. Of course, Lieut. Bettis was piloting a plane developed for the Schneider Trophy Race. However, the speed was not gained in a dive, since the N.A.A. had ruled, after the collapse of Capt. Sherrill's racer in the air in 1928, that the competitors must approach the turnabout in horizontal flight. The Pulitzer Trophy has never been competed for since 1928.

THREE 1928 National Air Races were held in Philadelphia, Pa., in conjunction with the Stag-Centennial Exposition, a celebration of the 150th anniversary of the Declaration of Independence of the United States.

The meet was entirely under civilian supervision with Howard F. Whalen in charge, and of the nineteen events, fourteen were for military flyers only, four for auxiliary and naval pilots and one for the National Guard units. The entry list totalled about 300, but the interest was not what was expected. This was probably due to the fact that the Pulitzer Trophy Race was set on the program. The most interesting race was the speed race with stops of 40 miles at the end of the racecourse, and the weather was not particularly good. The field, a new one because everybody left and nobody, and transportation over the roads leading from the city was inadequate.

The "Go to the Seaport" race was won by Fred D. Holt, flying from Eureka, Calif., to Philadelphia, a distance of 2,358 mi., in 36 hr. flying time. Second place was won by Austin Lawrence and third place was won by Russ Arnold. Both the GNS-5 powered Juniors from Long Field, Dallas, Tex., Tracy Jones with his elliptical-wing Curtiss Oriole powered with a Curtiss CO engine, growing resemble box kite in the ring, won the "Seaport" and "Bluff" races, the latter in all cases, two three- or four-passenger enclosed aircraft, a distance of 84 mi. His speed was 126.17 mph and it was his third consecutive victory in this event. The fact that a race course seasonally of 1928 design could still be winning varieties in 1929 indicated either a depressing lack of progress in design or something strongly defective in the racing rules intended to encourage commercial planes. James G. Ray took second place in a Phoenix Seaplane Flying Arrow, powered with a Curtiss CO engine at a speed of 127.81 mph. A National Guard race brought together eleven JN machines of the New York, Pennsylvania and Maryland National Guard units. The Guard was well faithful to the "Jimmy" in 1928, but the cost of its service was not at hand. The event was won by Carl W. Raab of New York at a speed of 93.68 mph.

The race for the Aviation Towns and Country Club of Detroit Trophy was won by J. G. Ray in his Phoenix Seaplane Flying Arrow at a speed of 136.47 mph, accomplishing the almost unprecedented feat of collecting Mr. Jones and his Oriole to second place, though by a very small margin. The efficiency bonus in this race was determined on the economy formula involving speed and load. The speeds were by Lieut. C. C. Champion, U.S.N., later holder of all the altitude records, flying the new Wright Bellanca powered with a Whirlwind engine. The Wright Bellanca was the pioneer among the modern group of

small single-engined monoplanes with the pilot seated inside the same cabin with the passengers.

After two preliminary heats were flown for the Aero Club of Pennsylvania trophy for light commercial planes, the final race was won by R. S. Hawke, a Waco, at a speed of 169.51 mph. Sixth place, flying a somewhat antiquated Thomas-Morse with an Anzani engine, took second place. Capt. Jim Baker of the Aer Club, took second place. Capt. O.J. Tolson, powered with a Curtiss D-12 450 hp engine, to victory in the Liberty League Builders' Trophy contest at a speed of 121.36 mph.

The second military event was a transport and bombing plane contest in which Half-Deafed L-4-H planes powered with Packard 800 hp engines competed against Douglas C-3 transports powered with Liberty engines. The Half-Deafed finished one, two, and three, and Lieutenant Wolfe crossed the line first at a speed of 123.71 mph.

The John L. Mitchell race for planes of the Blue Partner Group of the Air Corps was won by Lieut. L. G. Elliott at a speed of 169.4 mph. Capt. F. A. Pehlman was second with a speed of 160.1 mph. All the nine planes competing were Curtiss P-1 Hawks powered with Curtiss D-12 engines.

The comparison of flying boat military events with the corresponding landplane in December in 1928 is interesting. The speed of the observation planes had increased up to 135 mph, that of the bombers to 109, that of the pursuit ships (since 1928) by 54. The progress in performance, judged by itself, was unsatisfactory. More attention had been concentrated upon improving the strength, load carrying capacity, equipment installation, and general survivability of military planes.

The event taking the place of the Pulitzer Trophy



Left: Army planes remaining the line at Spokane, 1928. Above: Three Army biplane fighters flying after the formation.

race was the Kansas City Rotary Club trophy race, open for parasol and flying planes of the Army, Navy, and Marine Corps. The Navy was victorious in this event when Lieut. G. T. Cudby flew his Boeing PB-3 plane, powered with a 650-hp. Packard 24/300 engine, across the line in front of the others other monoplanes at a speed of 186.5 mph. Lieut. L. G. Elliott of the Air Corps was second and he brought a Curtiss Hawk P-3, powered with a 500-hp. high-compression Curtiss V-1600 engine, through at an average speed of 178.6 mph.

The final event on the program was a transport race for the Devott News trophy, open to commercial planes capable of carrying a useful load of 1,000 lb. Speed

and efficiency were the deciding factors of the race. Lieut. Champion again flew his Wright Bellanca, powered with a Whirlwind engine, and won both parts of the contest with a maximum speed of 121.36 mph.

In connection with the air races at Philadelphia there was also an aeronautical exhibit under the direction of the Aeronautical Chamber of Commerce of America held in the Transamerica Building. The first attempt to combine an exhibition with an air show was the National Roaring. In addition to the latest types of aircraft engines and aircraft and engine equipment, the Curtiss NC-4 the first plane to cross the Atlantic Ocean, was on exhibition.

In 1927 the National Air Races were held at Palm Field, Spokane, Wash., during the weeks of September 19 to 25. The arrangements were handled by the Air Derby Association of Spokane, working in conjunction with the National Aeromarine Association. Maj. John T. Fowler of the 41st Division Air Service, Washington National Guard, was the chief executive. Probably for the first time, the mass came near breaking

the frontiers of the 1927 races were two almost country courses from New York to Spokane, divided into Class A and Class B, limited to engines of piston displacements not exceeding those of the J-5 Wright Whirlwind and the Curtiss OX-5, respectively. Class A was won by C. W. Holman, in a Laird Superholman powered with a Wright Whirlwind, who flew from New York to Spokane in the total flying time of 19 hr. 42 min. and 47 sec. Second place was won by E. E.

Pelrough, in another Laird, whose time was 20 hr 18 min and 10 sec. N. R. Master was third place in a Gulf Armor. Fifteen planes started the race and seven finished in Spokane.

The Class B Derby was won by Charles W. Meyer, who flew a Waco 10 across the country with numerous stops en route in a total flying time of 30 hr 29 min and 15 sec. No time was taken out in any case for stops between contests. Leslie Miller won second place in Class B in 30 hr 47 min 13 sec, flying an Eaglerock, and third place was taken by J. F. Charles. Of the twenty-five planes that took off from Roosevelt Field, L. I., in Class C, only one completed the cross-country course. A non-stop race from New York to Spokane, in which there were three stops, failed to become a non-stop race as all three were forced down before they had reached their destination.

In addition to the cross-country races, there were San Francisco-Spokane Derbys, Class A and Class B. The Class A race was won by M. C. Lipps, who flew a Travel Air plane from San Francisco to Spokane without one stop en route in a total time of 8 hr 16 min 37 sec. Leo Schenckbar was second place with an International biplane. The Class B race was won by Gail L. Lappan, who flew his International biplane over the course in 9 hr 39 min 28 sec. Second place was won by D. C. Warres in a Travel Air biplane.

The planning of the Air Derby, and the enormous popular interest that it accumulated, were symbolic of the place that air transport had taken in the six months preceding the Spokane meeting. The demand was for constant bearing upon the ability of the airplane to go directly from place to place, and go in a hurry.

The races at the field opened with a free-for-all for amateur classes and a 100 mi. loop course for 80 and 100 mi. Ray Stoen's a Pieten Spreeberg won the 80 mi. average race at 126.46 mph, two-tenths of a mile less than he had made with the same type at Philadelphia the preceding year.

The second major was the Women Flying Trophy, open to planes powered with an OX-5 engine and carrying one passenger. Eustace Danner flew his Travel Air through to a victory with a speed of 102.55 mph. An Eaglerock and a Waco both came within four mph of the winner. Each plane carried a contest load of 340 lb. The Army Derby and the Dayton Zephyr Night lightplane Trophy races had only one entry, the Heath Parasol.

The Liberty Engine Shuster trophy race was won by a Curtiss Robin XH-1A, powered with the new Curtiss V-1250 engine. Lieutenant Harry A. Johnson flew his Travel Air through to a victory with a speed of 102.55 mph. Another Parasol, powered with a Danner QSC at a speed of 129.355 mph. Lieutenant Johnson's winning plane was a standard Curtiss Robin; of that date except for the substitution of wing radiators instead of the tail-type.

In the first all military competition race for the Spokane "Spokemaster's Reserve" trophy, Lieutenant Eugene C. Stiles of the Army Air Corps piloted his Curtiss XP-6A (Curtiss Hawk) powered with a Curtiss V-1250 engine and equipped with wing radiators to first place at the speed of 201.239 mph. The only other class close

to Stiles was Lieutenant A. J. Lyons, also of the Air Corps, in a Curtiss Hawk with a forced radiator under the nose of the plane. His speed was 189.609 mph. Two Navy planes finished third and fourth. They were both Boeing fighter-powered with Packard engines. The really phenomenal increase of speed over previous years, both for observation and for pursuit planes, represented



A Nation's Cup Trophy at the 1928 National Air Races

a new decidedly by the increased size of the Army Air Corps to see what could be done if some of the "prized" locations on the charts of military planes were abandoned and the lessons learned with racing machines applied directly.

The Standard Motor Car trophy race for large capacity military planes was won by a Fisher bi-engined transport piloted by Lieutenant H. W. Beaman. His time was 131.518 mph and his plane was powered with three Wright Whirlwinds.

In addition to the racing events there were various starting exhibitions and parades-and-judging contests. One event that brought the crowd to its feet was a nine-second jump from a single Douglas transport within 18 seconds, the first public display of that sort.

An new worth mentioning with regard to the 1928 National Air Races was that the monoplane type of construction which had been so much in the fore in the commercial market in 1927 was very little apparent at the races. Of all the planes in the field, which numbered a great many, only one was of the monoplane type.

In 1928 the National Air Races were held in conjunction with the Los Angeles Aeronautical Exposition at Los Angeles, Calif., and turned out to be one of the most successful meet contests from the standpoint of financial success and attendance ever held in the United States. During the new days of the meet there were over 900,000 paid admissions and at least as many more passes admitted the flying from outside the grounds.

That year there were six cross-country air dashes,

Classes A, B and C from New York to Los Angeles; Classes A and B from San Francisco to Los Angeles, and an international race from Whidbey to Los Angeles. In addition there was a non-stop race from New York to Los Angeles, but like the 1927 meet this non-stop never got started on the writing wing.

The winner of the Class A derby for the biplane-powered machines from New York to Los Angeles was Earl Rowland, who flew his Whirlwind-powered Crossman airplane over the course in the total flying time of 24 hr 31 min. Second place was won by Robert Duke, who flew his biplane Whirlwind over America, making the entire trip in ten hours of 25 hr and 18 min 43 sec. Third place was won by W. H. Powers, who flew a Travel Air, also powered with a Warner. The Warner engine made a clean sweep. The Cox K-3 had disappeared at last.

Class B was won by John Livingston in a Whirlwind-powered Waco, on the time of 22 hr 26 min 26 sec. Max New York to Los Angeles. Second place winner was E. E. Ballouk in a Whirlwind-powered Latigo in a total flying time of 22 hr 16 min 26 sec. Third place was won by J. P. Ward, who flew a Whirlwind-powered Waco.

The Class C race from New York to Los Angeles was won by Robert Campbell in a Lockheed with a Pratt & Whitney engine. Second place was won by the late Captain C. D. R. Colyer, who flew a Fokker biplane. In fact it was the same plane, "The City of New York," in which he had finished a record the world record in 1928.

The Class A derby from San Francisco to Los Angeles was won by E. E. Myrick, who flew a Kinner-powered Super Six over the Pacific Coast course in 8 hr 10 min 26 sec. The Class B Goldmark in Los Angeles race was won by S. C. Lippert, flying a Whirlwind-powered Travel Air in 2 hr 26 min 49 sec.

Although the 1928 National Air Races were primarily intended to be a civilian affair, the military, naval and marine corps pilots held the center of the stage throughout the entire nine days of flying in such an extent that the audience often did not know where a civilian man was going on. Of the three branches of aerial defense the Navy was the most conspicuously represented, and the first flight of the Naval Air Races were being held near a center of naval air activity, and the Bainbridge's Aircraft Squadron had a chance to show what they could do. In name at "Sea Hawk" composed of Lieutenant W. V. Davis, Jr., Lieutenant T. Tolleson and Lieutenant A. P. Stevens put on scintillating formation flying displays of the most notable order. Alternating with the Navy team was the Army group composed of the "Three Musketeers."



The "Three Musketeers": Left to right, Lieutenant W. V. Davis, Jr., Lieutenant T. Tolleson and Lieutenant A. P. Stevens

"Musketeers." This original group was made up of Lieutenant W. L. Gorrell, Lieutenant J. A. Woodring, and Lieutenant J. J. Williams. Due to an unfortunate crash which resulted in the death of Lieutenant J. J. Williams, Gorrell, Captain A. Lundquist became one of the Three Musketeers. In addition to the precision flying of these two groups, there was some beautiful flying performed by Army, Navy, and Marine Corps bombing and attack squadrons.

The first racing event was a closed course ten-lap race for Marine pilots flying Vought "Corsairs" and was won by Lieutenant Culhane at a speed of 129.12 mph. At this point the Class A closed course planes came in, a bit earlier than expected. The next racing event was for pilots of the First Pursuit Group for the John L. Mitchell Trophy and was won by Lieutenant E. H. Larson at 134.741 in mph, a lower figure than had been required for victory in the same event at Spokane. The same was twelve laps over a 10 mi. course for the John L. Mitchell Trophy, and the planes were Curtiss P-1A. B pursuit planes powered with the Curtiss D-12 engine. The speed was 136.196 mph. The speed was a little over one mile faster per hour slower than the speed won the following year's winner, a Curtiss P-1E flown by Lieutenant Woodring over the course of 138.961 mph.

The third military race on the program was a twelve-lap closed-course event over a 10 mi. course for pilots of the Third Attack Group and the planes used were the Army attack type powered with Curtiss D-12 engine. This was the first annual race for the Major M. Patrick.



Part of the Class B New York to Los Angeles Air Race, 1928

Trophy, presented by Assistant Secretary of War Bassett, and it was won by Lieutenant G. R. Achtermann at a speed of 139.5 mph. Second place was won by Lieutenant H. W. Anderson at 139 mph, and third place by Lieutenant E. L. Roberts at a speed of 138.96 mph.

The fourth event was also a military affair, being a race for the Liberty Engine Butler's Trophy and was won by Lieutenant Kase at an average speed of 142.5 mph. Robert Gossel, winner of the Class C transcontinental air derby, flying a Wasp-powered Lockheed Vega, won first place with an average speed of 140.8 mph. Arthur Goethel was second, also in a Wasp-powered Vega, at an average of 139.7 mph.

It will be remembered that a Curtiss Falcon fitted with a Curtiss V-1530 engine won this race at Spokane in an average speed of 141.18 mph. However, the water-cooled machine was not a standard Falcon, as it was fitted with wing radiators.

Then came the first civilian race, a one-leg affair over a four closed course and open to civilian planes equipped with engines capable of 210 hp or displacement. Four boats were flown and the winners of cash hot flew in the final, which was won by Earl Russell flying the Wisconsin-powered Cessna, with which he won the Class S New York to Los Angeles Derby. His average speed was approximately 111.74 mph. Second and third places also went to Warner engines while all the other entries were OX-5-powered.

The second civilian event was a free-for-all for open-cockpit planes powered with engines of 300 hp or less, the planes being built by E. Bellanca flying a Whirlwind-powered Bellanca, hot with the rest at an average of 132.9 mph.

In a Kyno pursuit race over a 20-mile two-leg course, Lieutenant John G. Crampton won, flying a Boeing F2B over the course at an average speed of 148 mph.

Then came a 20-mile two-leg light airplane speed and efficiency affair which was won by E. S. Heath in his own Heath monoplane "Baby Blitzen" powered with a Bristol "Cherub" engine. Heath's speed was 111 mph. Van Roberts in a Moisseyne powered with a Vultee engine was second at an average speed of 97 mph. Heath's plane, with its 45 lb. wing load, caused great excitement in the crowd. It was extremely fast, but had a poor turning type with a very high landing speed, intended for other series. It represented a great departure from the types of which light plane construction and competition have been materials.

FOLLOWING the light plane race came a 50-mile two-leg race for two-place National Guard planes. This event was won by Lieutenant Roop in a Douglas O-2B, powered with a Liberty, at 38 miles. It was at an average speed of 125 mph. The JNs were at least gone from the National Guard as elsewhere.

In a closed event for the 10th Pursuit Squadron, all entries were Curtis Hawks powered with Curtiss D-12 engines. Four place honors went to Lieutenant Cartwright who flew the course at 148 mph. Cartwright took the lead at the start of this race and continued to increase it right to the finish line. He had already won the race by nearly enough with Lieutenant McElroy who still had a leg up to go. Only quick maneuvering on the part of Cartwright won the race.

The Cessna team had a race to go for to equal the record of four events at Los Angeles. However, according to legitimate informants, the Cleveland team will be fully up to the standard on last year at Los Angeles, and the Aeromotors Exposition will be one of the greatest of its kind in the history of the industry.

the center of the circle. George H. Bush of the San Diego Naval Air Station, was second with a distance of 96 ft. Waddington Beach were the only two jumpers to hit the circle.

Then came a 200-mi. 16-leg civilian free-for-all for any type of cabin plane powered with one, two or three engines and carrying a cockpit load of 1,000 lb. Robert Gossel, winner of the Class C transcontinental air derby, flying a Wasp-powered Lockheed Vega, won first place with an average speed of 140.8 mph. Arthur Goethel was second, also in a Wasp-powered Vega, at an average of 139.7 mph.

THIS FINAL DAY of racing broke all records for attendance, a total of over 30,000 persons visiting the exposition and the races at Mineola Field. As had been the case throughout the entire week of activity, the Army and Navy planes again held the center of the stage and put on a fine exhibition of formation and stunts flying.

The final event of the day was the 100-mile air derby, which was won by Earl Russell flying the Wisconsin-powered Cessna, with which he won the Class S New York to Los Angeles Derby. His average speed was approximately 111.74 mph. Second and third places also went to Warner engines while all the other entries were OX-5-powered.

The next event on the program was a 25-mile 16-leg race for Standard Guard, Army and Navy Reserve pilots flying Army PT training planes. Then followed a special display for Liberty-powered Douglas planes from Chicago Field.

The closing contests of 1928 National Air Races were a 100-mile two-leg race, involving a climbing and diving to 10,000 ft. and return. The winning aircraft was won by F. French in an Aeromotors Klemm, who came in to rest 4 ft. from the finish line. An Eagletrock took second place and a Travel Air third. This type of novelty event, testing the pilot rather than the plane, was very welcome. It had been almost completely absent from the program for several years. In the climbing and diving event Lieutenant T. P. T. Jeter was first place in his supercharged-Wasp flying XP4B by making the trip up to 10,000 ft. in five minutes and returning to the ground again in 1 min. 53 sec. A Curtis Hawk was second and in other series. It represented a great departure from the types of which light plane construction and competition have been materials.

Although the 1928 National Air Races failed to show any marked improvement in performance, the racing was certainly the speed of the various commercial planes involved were much higher than those regarded as passenger transports and the all-round dependability of the new planes and engines was well demonstrated. The Aeromotors Exposition itself, although secondary in importance and attractiveness to the races, was well laid out and interesting, especially to spectators not actively engaged in aeronautical work but drawn out by the excitement of the meet. Two hundred and fifteen airplane manufacturers, distributors, makers of accessories, aviation tools, Charles of Commerce, etc., occupied booths in the big pavilion at Mineola Field. The number of planes on exhibition totaled 38 and varied widely indeed were representations by themselves.

The Cleveland team had a race to go for to equal the record of four events at Los Angeles. However, according to legitimate informants, the Cleveland team will be fully up to the standard on last year at Los Angeles, and the Aeromotors Exposition will be one of the greatest of its kind in the history of the industry.

DAILY Program of Events at CLEVELAND

National Air Race Program

SATURDAY, AUG. 26

2:00 p.m.—Inaugural parade

2:45 p.m.—Motor flight

REVIEW, AUG. 26

16:00 p.m.—Arrival of Air Derby

1:00 p.m.—Start of All-Obo Derby

1:00 p.m.—Event No. 6, 30 mi.,

civilian, 100 hp.

2:00 p.m.—Arrival of Navy planes

2:00 p.m.—Event No. 7, 30 mi.,

Liberator engine, National Guard

2:00 p.m.—Event No. 20, 100 mi.,

multi-engined planes carrying 1,000 lb. pay load

MOTOR, AUG. 26

10:00 a.m.—First glider flights

From 1:00 p.m.—Arrival of Woods

Monroe Air Derby from Santa Monica, Calif.

Race No. 4, 100 mi., Marine

Spurred Hawk

Race No. 8, 120 mi., Army attack

group

Arrived of All-Chic Derby

Race No. 14, 120 mi., military two-

place Liberty engine planes

YARDAGE, AUG. 26

10:00 a.m.—Demonstration of com-

mercial aircraft

11:00 a.m.—Glider contests

From 1:00 p.m.—Arrival of Miami

Miami Beach Derby

Arrived of Peacock, Ore., Derby

Race No. 1, 100 mi., women, 915

max displacement

Race No. 2, 100 mi., civilian, 300

max displacement

Race No. 3, 90 mi., civilian, 375

max displacement, pay load

YARDAGE, AUG. 26

12:00 p.m.—Glider contest

From 1:00 p.m.—Arrival of Oak-

land City Derby

Arrived of Philadelphia Derby

Arrived of Rice of Chic Derby

From 1:00 p.m.—30 mi., civilian, 275

mi. displacement

Race No. 26, 60 mi., women, 510

max displacement

YARDAGE, AUG. 26

10:00 a.m.—Glider—Cleveland

super single engine contest

From 1:00 p.m.—Arrival of Clev-

eland Derby

Race No. 12, 60 mi., civilian, 240

max displacement per person

Race No. 13, 30 mi., civilian, 720

max displacement

Race No. 26, 60 mi., women, 510

max displacement

YARDAGE, AUG. 26

From 1:00 p.m.—Races

Race No. 17, 30 mi., civilian, 300

max displacement, pay load

Race No. 21, 130 mi., Navy pur-

suit

Race No. 30, 60 mi., women, 275

800 cu.in., Australian pursuit race

SATURDAY, AUG. 26

From 1:00 p.m.—Event No. 7, 120

mi., Army attack and endurance

Race No. 22, 75 mi., civilian, over

800 cu.in., Australian pursuit race

10:00 a.m.—Joint conference of Paul

and Lehman contractors with Air

Transport Operators.

10:00 a.m.—Propeller Design Sem-

inar S.A.E. and A.C. of C.

1:00 p.m.—S.A.E. and A.C. of C.

expedition trip to Goodyear Zeppelin

Plant, Akron.

3:00 p.m.—Aeronautics dinner and

dance, S.A.E. and A.C. of C.

WEDNESDAY, AUG. 26

9:00 a.m.—300 mi. open class com-

petitive motor, A.C. of C. Commercial

Airplane Manufacturers' section, Paul

and Lehman contractors.

1:00 p.m.—Glider—Cleveland

super single engine contest

FRIDAY, AUG. 28

9:00 a.m.-1:00 p.m.—A.C. of C.

Spring School committee meeting;

Patron-Dinner section

9:00 a.m.-10:00 a.m.—National Avia-

tion Association Convention.

SUNDAY, AUG. 29

9:00 a.m.-2:00 p.m.—S.A.A. con-

vention.

SATURDAY, AUG. 30

9:00 a.m.-12:00 p.m.—S.A.A. con-

vention.

9:30 a.m.-1:30 p.m.—See Mech Eng.

Special Session.

WEDNESDAY, AUG. 26

10:00 a.m.—Joint conference of De-

partment of Commerce with Commer-

cial and Aviation Manufacturers' section

A.C. of C.

WEDNESDAY, AUG. 26

9:00 a.m.-10:00 a.m.—Exhibition

area for prints and models of Avia-

tion industry.

10:00 a.m.-10:45 p.m.—Expo-

nition open.

11:00 p.m.—Motel Extravagan-

za.

ATTRACTION: Chamber of Commerce

conference will be held at Hotel

Shelby.

Joint sessions of Society of Auto-

matic Engineers and Aeronau-

tical Chamber of Commerce will be held at Hotel Hollings.

National Aviation Association break-

fast and conference will be held at Hotel

Glenview.

National Aeroplane Association con-

vention will be held at Hotel Cleve-

land.

THE Military Value of AIRPLANE RACING

By LIEUT. COMDR. FRANK W. WEAD

U.S.N. (ret.)

HIGH SPEED RACING in the past has given a great impetus to airplane and engine design, and has spurred the development of many planes that are directly and beneficially reflected as nearly every airplane in use in the United States today. It is only natural that these improvements were first applied to the racing and fighting planes of the Army and Navy, for such service ships are, in comparison with most types of high performance and most racing skins, racing types than any other class of aircraft. Following this trend peacefully every single-engine biplane now in commercial or service use has learned something—and that something may vary from general arrangement to a minor detail—from flying plane design.

For several years after the World War flying planes in the United States were of such low performance that in reality they were little more than single seat training

planes. In 1920, 1921, 1922 and 1923 a few high speed racing planes were built for the Army and Navy to compete against each other in the Pulitzer Cup Race. Two of these planes were later converted into seaplanes, and in 1925 won first and second places in the Schneider Cup Competition between England and France. At this time foreign racing teams were in every "piped up" or modern racing aircraft. It was this American victory that gave foreign aeronautical engineers their first glimpse of racing airplanes designed primarily for speed and started the development of similar types in England and Italy.

The top speed attained by any of these American racing planes prior to 1924 was about 265 m.p.h. in straight flight as a biplane. (It may be noted here that "cruise speeds" are invariably lower than speed-in-straight flight, and that the added resistance of floats, of course,



The U.S. Schneider Cup team in 1924. Lieutenant Wead is shown. Left to right: Lieutenant Edward E. Coffey; Lieutenant Charles C. Golding; Lieutenant Edward C. Gandy; Lieutenant William H. Williams.

The military airplane which Major Alfred Williams expects to fly at Cowes, England, in September.



Lieutenant Comdr. Frank W. Wead writes from experience. He was a member of the Navy's Schneider Cup team both in 1923, when the trophy was won from the British, and in 1924. Having known racing at first hand, he has also been a close student of the purely military aspects of aviation, and has made valuable contributions as an tactics and naval air material to the United States Naval Institute and other professional journals. His analysis of the extent of the parallel between racing and fighting development should be read with interest by all students of design.

reduces the top speed of a type below its landplane speed). This speed of 265 m.p.h. was attained by gradually refinements of the same type of racing plane and power plant. In 1926, 1927, and 1928 an additional small measure of speed was attained through further refinements, but the indications clearly were that the limit had about been reached in this American water-cooled biplane racing type, and that a radical increase in landing speed (Pulitzer rules required a thousand landing speed of not more than 85 m.p.h.) or a new and superior power plant was necessary to gain a marked advance in speed. In 1925 the Army and Navy both abandoned the Pulitzer Race, and since Italy's victory at Nørholm in 1926 the United States has not been represented in the Schneider Cup. The design and preparation of several racing planes each year costs a considerable sum of money,

and economy has been advanced as the excuse for governmental abandonment of racing projects.

In 1928 and 1929 the experience gained in racing led to some begins to make itself definitely felt in our fighting planes. Newly designed single seater were better streamlined, fitted with metal propellers, spars, and tailplane radiators, while power plants delivered more power at higher r.p.m. and they were fitted with the engine nacelle rotatable, and they were found to travel considerably faster than previously considered advisable with a correspondingly greater high speed. Wing radiators, previously found in racing planes, have never been fitted to service types because of their unsuitability to cold air at extreme altitudes and their vulnerability to machine-guns fire. It was soon discovered that the average service pilot could handle these fast flying types without difficulty in fields or on the decks of aircraft carriers. It is necessary that fighting planes enjoy machine guns and other equipment, that the wing curve be so located for other considerations than pure speed, and that they offer the pilot better visibility in combat and have greater maneuverability than racing planes. Notwithstanding these differences these new fighting types distinctly had their origin in our early high speed races.

Just as one racing plane made no radical advances during the five or six years that the United States was actively engaged in high speed contests, neither have our present types of fighting planes improved to any great degree since their inception. It may be noted, however, that during 1921 to 1925 the United States, generally speaking, had the world in its grip, and that this period was unquestionably rather than otherwise, the most important in the history of aerial warfare, and hence, naturally, the modern types did not exist. From 1924 to 1926 our fighting planes were also quite superior in performance to various foreign types, primarily because foreign engineers did not well realize how the benefit of several years of high speed racing experience behind them. Since 1927 our fighting

planes have been built almost entirely around air-cooled radials, giving a better climb than that of water-cooled planes with little if any loss in top speed. These planes handle well and perform nicely, and for that reason perhaps we have been prone to be a little too content with them.

In general, modern fighting planes are not markedly superior to those of four or five years ago.

In 1925 England sent its first two high-speed airplanes into the Schneider Cup at Biarritz. They were very sweepers but probably spoiled these chances for victory and the winner turned up in Lieut. Jimmy Doolittle of the Air Corps. In 1926 Italy won the Schneider Cup at Norfolk. In 1927 England came to Venice with the unassisted cruise speed of 381.5 m.p.h. This speed indicates a probable straightaway handicap speed for the



Above: Gloster Gladiator, one of which Adcock's Rides was the Schneider Cup Run in 1927. Below: The same aircraft (Serial No. 24, Serial No. 61, R. 8492) at RAF-P. Adcock's first flight since 1920.



same type of around 385 m.p.h. This truly remarkable speed was gained through perfect streamlining, boosting the power output of the Napier Lion to around 900, obtaining the best propeller efficiency by using gears, keeping the fuselage as small as possible, and accepting a landing speed of some one hundred and twenty miles per hour.

Now, ever since the war British fighting planes have been light, bushy and decidedly inferior in climb. British pilots and engineers apparently never forgot the dent made in the Schneider Cup record when the team on us who made another country so its name. The Bristol Jupiter radial was going into military service as a piston plane power plant in Fairley "Flycatchers" and other ships of the Royal Air Force long before we had an air-cooled engine worthy of notice. Combined with their experience in designing around air-cooled engines British engineers now lead the world in designers for speed. It is not to be wondered that recent British single seater fighters have an overall appearance that when placed beside our later types of the same type makes the latter appear, to say the least, somewhat clumsy. The performance of these recent British fighters does not belie their appearance.

In high-speed racing the fighter ship usually comes home to roost. In our fighting planes form the backbone of a nation's air strength, and that side which is equipped with fighters over slightly inferior in performance, though it may be superior in numbers, is working under a tremendous handicap. In combat or dog-fighting between pilots of equal skill the superior airplane inevitably wins out.

There is no other form of competition or race that can supplant or take the place of high-speed racing, where



Gloster Gladiator with Pobjoy engine entered in the 1938 Schneider Cup Run.

aerodynamics and engine design must combine to strive for, not a military victory but the ultimate. If we grant that the aerodynamical limitations of high speed racing has in the past prevented something in our fighter plane program, one may possibly question that now, when fighters are universally powered with air-cooled radials and the record-breaking races of England and Italy are still fought around the same early streamlined water-cooled radials. In 1927, however, one of the English entries in the Schneider Cup was a Short monoplane powered with a special British Hispano air-cooled radial delivering some 800 h.p. This plane unfortunately crashed to a smoke a few days before the speed contest at Venice. In press notices the Leader of the British High-Speed Flight stated that he believed this ship to win, as the Schneider Trophy was given to the first equal speed in the Supermarine Nighthawk. Gloucester, which finished first and second. The Short machine had a radial cylinder head surrounded with an individual cooling shroud to a knight's helmet, fitted with leaves for cooling. Perhaps some modification of the N.A.C.A. cooling design would be even more effective. It is possible that were such a cowling adopted to service fighter planes, cooling trouble might arise in prolonged combat at full power, but it is certain that if this should prove to be true these troubles may also, with experience, be overcome.

The contention is that such an air-cooled single place fighter is weight and probably somewhat lower-powered than a similar water-cooled machine, can be fitted with smaller wings and have the same landing speed as its heavier water-cooled sister plane, and that the decrease in drag thus obtained may more than offset the greater resistance of the radial-type engine. It would seem

that a government program to produce say two air-cooled high speed racing planes each year for a period of three years to return to the Schneider Cup and to strive to beat existing handicap and supreme speed records would be a very definitely worth while regardless of cost.

The personal aspects of high speed racing are also worthy of mention. Service test pilots and racing pilots almost invariably come from fighting plane units, whose single seat operations create competition among them as individuals rather than as crews. The effort to stand out in service and develop superior skill as a pilot improves the quality of our fighting work and may be definitely furthered by the knowledge that selection as a member of a racing team may be a possible reward.

I T CONCLUDING it may be stated that the United States has abandoned high speed racing as a race which friendly national interests and competition would keep open the lessons learned in victory or defeat of greatest value to us. We are now solely behind in the design of high speed airplanes and the development of power plants for them, a state of affairs that is now being reflected in our fighting planes. The present speed and spacing effort of Lieutenant Al Williams and his associates in place am足以 to that year's Schneider Cup, backed by the tallest possible mechanical support of Admiral Moffett and the Navy Bureau of Aeronautics, is worthy of high praise, but must soon be discontinued to anyone who is familiar with the great number of problems and difficulties to be encountered in a task that no return full value to the government should be wholeheartedly originated, financed, and put over by.



THE VALUE OF

By C. S. JONES
President, Curtiss Flying Service, Inc.

SNCE the very early days, airplane racing has played an important part in airplane development. In fact, racing and the various prizes offered and the events set up have done more to develop aviation both technically and by increasing public interest than any other one thing since the war. With the outstanding flight of Colonel Lindbergh so recent, readers will question this statement, but a man can not be forgotten that even his flight was made popular by a group of men and women drivers who took up the racing prize offered by Roger and Gouge. So it has been with practically all of the great flights. Prizes stimulated inventors and countered the inertness of the world in aviation.

The purpose of this article, however, is not a discussion of contests or of setting air records, but rather of aerial airplane racing and its present value. The very early Belmont Park Meet did much to encourage aviators, who were for the most part their own manufacturers, and created tremendous public interest. The pre-war contests for the Gordon Bennett Trophy did much more to stimulate new and better designs and public interest, and led to this close attention of the world to the development of racing.

There was racing during the War. Soon afterwards came the important New York-Syracuse Race in 1919. It was open to all types of airplanes and attracted lots of real interest to those of the general public who were closely following air-warfare. However, due to the difficulties of handpicking the various entries and to a certain understanding concerning the distribution of the prize money, it could hardly be considered a great success.

The following year the Army conducted the Transcontinental Race which was won by the late Lieutenant Maynard—the Flying Tomato. It is interesting to contrast the flying time, 10 years later, with the latest transcontinental record of 17 hr. 38 min. This race was well covered by the newspapers, and was the forerunner of the transcontinental air race.

The National Air Races started in 1920 at Mitchell Field on Long Island. The individual event of greatest importance was for the Pulitzer Trophy, and for several years thereafter that speed contest was the big of American airplane racing. Lieutenant C. C. MacAuley, the Verville man who had been built by the Army to compete in the Gordon-Bennett Trophy race in France the preceding year, attained a speed of around 160 mph. It is interesting to note that, largely due to the

Mr. Charles S. Jones, more widely known as "Gerry," has had extended experience in the racing both of stock and of race-built airplanes. His is the unique record of having been among the winners at five National Air Race meets. His remarks on the manufacturer "stock-model" situation, contained in the latter part of his article, and on the desirability of an improved control over racing of stock planes are especially important in any plans for the future of air racing. They touch a point upon which organizations marketing airplanes to the public naturally feel very strongly.

knowledge gained in constructing seaplanes, the standard Army racing plane, by 1922, was faster than the hand-picked racing rear which won the trophy in 1919. In 1923 at the National Air Races in Cleveland, Major A. A. Wills, the famous afterburner expert, won the U.S.A. "V-12" which he had originally built for a Gordon-Bennett Race. The speed this time was 196.7 mph, and although there were several other fast racers in this event these two were the only ones which really had a chance to win.

1924 was a banner year for speed racing. The Army gave contracts to a number of different manufacturers to build racing models for the contests at Detroit, and as a result of their keen engineering competition, a speed of over 200 mph was attained for the first time. This race was particularly exciting for the spectators, who witnessed the greatest number of fast ships in racing competition that had ever been assembled for that purpose.

AVIATION
August 28, 1939

Airplane Racing AND THE Stock Model

St. Louis was the scene of the Pulitzer in 1925. Here the Navy forced to the front while Lieutenant Harold Williams won, with Lieutenant Harold Brew a close second. The speed was 243 mph.

Western hundred twenty-four at Dayton showed no advance in speed, as the planes used were those developed in the previous year. The contest was further greatly marred by the death of Captain Skell.

In 1928, again at Mitchell Field, the highest speed ever attained in the Pulitzer Races developed in a hot contest between "G." Gerry, in "Viper" racer and "A." Wills' "V-12". Wills' machine, the pace going to Davis in a close finish at 368 mph.

Reviewing this development, close up to 1928, it must be borne in mind that while each year showed an increase in speed, it had become considerably more expensive

to obtain it. Several lives had been lost and it had become questionable whether or not the accomplishing of high speed was worth the expense in money and men. Apparently, in the opinion of manufacturers, the competitive limit had been reached, and, consequently, as regards the National Air Races, from 1925 on the insistence on sheer speed has decreased and the interest switched to a variety of racial training efficiency as well as speed in stock models.

In THE MEANTIME, however, greatly speed contests have been carried on without reference to the competition for the Schneider Cup—the only event left which promotes tremendously high speed. According to the experts, any country which wins three times as a reward of five years retains the trophy. In 1923 the cup was brought to



"Gerry" Jones and the Curtiss R-6 racing biplane which he flew at the International Air Races at Dayton in 1924.

the United States by Lieutenant Rutherford, who was at Cavers, England. In 1925 at Belmont, Lieutenant Donisthorpe, who was at the air and had the United States, was to hold the race, but the American pilots, naturally could have remained the true champions, but because of the lack of competition we had refused the opportunity. In 1926 the British invited the *coup d'etat* Americans in a thrilling contest in which England did not enter, and in the next year, in 1927, England tampered the trick again. Italy while the United States was absent, and planned the fastest speed ever attained in a closed-circuit event—283 mph. The contest this year is to be staged in England between England and Italy, although it has been recently announced that European Williams will represent the United States with a special machine constructed by private capital with the co-operation of the Navy.

Over a period of time, one of the leading American manufacturers was approached in the matter of holding a race to win the trophy in 1928 or 1929. After the most careful consideration, it was decided that it reported that America probably could not only attain a record of a million dollars and two years' time. The United States, after much debating, decided that the game was not worth the candle and dropped the matter. All this is simply a matter of general history—the only thing to stress being that it would take at least two years and a great deal of money to produce a plane of sufficiently new and better designs to beat the present speed record. [In 1928 the Italians did it in much less than two years, as set forth in Commander Sorenson's article, but only under concentrated national pressure and by very liberal expenditure of money.—Ed. T.] Since there is grave doubt in the minds of those most interested whether the results warrant the expense, it seems quite evident that speed racing alone, has almost reached the point of no economic development.

EVEN though within Lieutenant Williams every measure in the approaching contest, lost or should win repeat the preparation of England and Italy must repeat the preparation in modern racing history.

In contradistinction to this class of racing for pure speed, there has been assessing contests and an increasing number of entries in the various events for commercial jobs of different horsepower. Commercial races started at Ontario in 1921, and at first they too were largely on pure speed. Very soon, however, it became apparent that the best purpose of commercial aviation could be served by eminently looking to records by stock models, i.e., records of various types of propeller airplanes with increased attention to efficiency as well as speed. Increasingly certain systems crop up in and a great deal of hard decision was exercised, until at length various understandings. What is more, the public has undoubtedly been foisted by the published results of the races held for so-called stock models. Much careful thought needs to be given this whole matter of commercial racing—particularly in the matter of rules and regulations governing contests. It is my opinion that should a race be advertised as “Stock Models,” it should be strictly limited to contestants flying genuine stock models and not those that have been puffed up in various ways—whether by motor or fuselage changes or propeller settings. No alteration whatever should be allowed, and any such changes should immediately disqualify the contest. As recently as during the past two

years, numerous planes competing in, and sometimes winning, various events have been advertised by their respective promoters as stock models, when in reality they do not resemble the stock model than a special boat does a general boat. Perhaps the only way to regulate this would be to require the machine on the floor of the factory, as it comes through on the line, then make the manufacturer enter this in the race without any change whatever.

Racing under such regulations, either for speed or efficiency, would be a true test of comparative air performance and the manufacturer most successful would then be justified in advertising their particular products and expending on their successful efforts.

THIS is now a place for speed racing with various models having desired piston displacement, and in these races anything to increase the speed or the efficiency should be permitted, but it should be made impossible by written certain regulations under such conditions, for the various manufacturer to advertise the winning plane as stock equipment.

The Ford Tournaments and certain State Tours, are typical of another type of racing which has all manner various purposes. They are, in effect, the child of Chilton, Tong, and others, who for the automobile industry a certain public confidence, and favorable preference for the motor car, passed on, as these events will also suffice their usefulness and be remembered only in retrospect.

In this general discussion of competition as a real aid to the industry, there are still several advantages to be derived from the National Air Races. The publicity which attends the racing, particularly that which occurs in the successive cross-country events, fosters keen interest in aviation during the racing period, the fact that the races are held at different points throughout the United States each year, gives a vast number of different people a chance to see a great number of airplanes at close and to view the race, as well as the sights of the pilots and mechanics, and the interchange of ideas is always valuable. Finally if the Races are conducted on a basis of科學 basis, they should be immensely helpful to the organization which runs them and that, ultimately, of benefit himself in the industry as a whole.

An engine race is not, of itself, particularly exciting unless it can be run over a short course in view of its operation, and here, if the speed is great or the course very short, the risk amounts up tremendously. It is, too, almost impossible to collect spectators from anywhere. So the number of people who are actually attracted by the event—any neighboring village is a great distance away. With reasonably detailed arrangements, changes in some future date it will be possible to limit the races to a number of cities to avoid possible check at Indianapolis—a place especially designed for it which can become a yearly festivity. As a matter of fact, unless some such solution is worked out at a not too distant time, I fear there will no longer be a need for the National Races as they are conducted today. Perhaps the future will see a pattern similar to the Meadow Show sponsored by the Royal Air Force in England—a program more in the nature of a historical or scientific performance, with formation flying, static air battles, bombardments, etc., forming the chief interest. Perhaps this sort of show, as the industry advances, may prove of even greater benefit in the future than our exceedingly worthwhile racing has proved in the past.

CHRONOLOGY AND TABULATION OF

Airplane and Seaplane Records

By COMMISSIONER OF THE NATIONAL AERONAUTIC ASSOCIATION IN WASHINGTON, D. C.

The curves, Figs. 1, 2, and 3, represent a chronology of world records for landplanes and seaplanes. Fig. 1 shows all distance (range-reaching) records in excess of one hour. The vertical scale employed was used to facilitate reading the earlier records. In Fig. 2 is shown the altitude records in excess of 3,000 ft. and in Fig. 3 are plotted the maximum speed records above 400 mph.

Present world and American records are presented in Tables I, II and III for Class C Airplanes, Class C-2, Seaplanes and Light planes, respectively. In each case the country, record, airplane and engine are presented on a separate line and in the above mentioned order. The curves in Fig. 4 show the decrease of speed with distance in the existing zero pay load records.

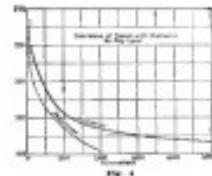


Fig. 4

A COMPLETE TABULATION of world and American *Highest-Altitude-Air* records is herewith presented. All of those with the exception of the current record have been recognized by the Federation Aeronautique Internationale and all have been established under the rules and regulations of that body. For their translation and compilation we are indebted to the ex-

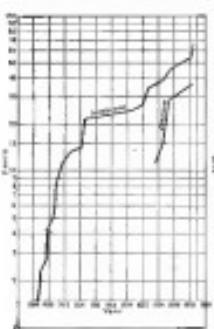


Fig. 2

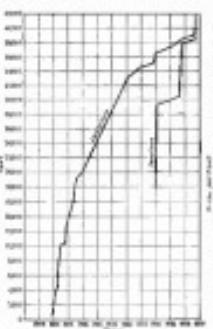


Fig. 3

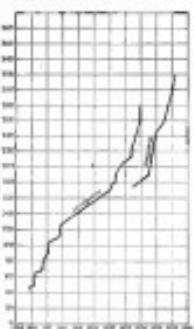


Fig. 1

Table 1: Class C Airplanes Returning to point of departure without refuelling

Table 7: ChemC2 Statistics

Table 1: List of Run Records

Table 3: Light-Plane Bounds (Continued)

Eng. Capacity— Welded Steel Boxes Last Size up to 100 ft. 6 in.		Eng. Capacity— Stud Welded Steel Boxes Last Size up to 100 ft. 6 in.		Third Capacity— Stud Welded Steel Boxes 100-200 ft. 6 in. (140-171 ft. 8 in.)	
Width	Thickness	Width	Thickness	Width	Thickness
Microns (mm)	Gram Equivalents per in. 2				
Spiral box 100 ft. (30.5 m.)	Gram Equivalents per in. 2 120 ft. thick Gauge 100 kg.				

DEVELOPMENT OF

HIGH SPEED Racing Design

By WILLIAM WAIT, JR.
Chief of Design Berlin-Joyce Aircraft Corp.

MAN'S CONSTANT BATTLE against time since the earliest ages has laid an increasingly large premium on time-saving methods of transportation. This has caused a true of invention, varying from the primitive stages of waterways through to the airplane of the present. A study of the various mechanisms used will fail to show any great variation from the basic principle through the life of any one device. The intention of racing does not differ fundamentally from Flying. The railroad man is usually the same as Stephen's engineer, and the airplane at Wright's time was as Stephen's original and the airplane at Bellanca's time as the Wright brothers' primitive machine.

In all the devices that have been used through the centuries, the changes that have given us the highly efficient methods we use today have been due to attention to and perfection of detail. This gave attention to the most minute detail will spell the difference between winning and losing in the slow air competitions that exist today. Perhaps the easiest way to emphasize this fact is to point out the progressive modification of the racing airplanes with which the writer is personally familiar.

In 1926 the Curtiss Company built a racing airplane, familiarly known as the Texas Wild Cat, to the order of Mr. S. E. J. Cox in an attempt to win the Thompson Cup race in France that year. This airplane was nearly the first aircraft designed applying design to the essential features of this plane being present in all of the successful planes designed since then. The fuselage was designed to be as small as possible and still properly house the motor and rudder. The wing structure was a rapidly housed autoclave made from around one of the earliest known low resistance alloys known. The radiator used in the plane was especially designed so it is an enclosure to cut down resistance and was built up of hollow plates mounted on the sides of the fuselage as fins. A retractable radiator was fitted below the bottom of the fuselage. The combination providing a radiator combination of very low resistance for those days. It is of interest to note that the original wing surface type radiators were put out for use on this airplane but were never built as the pressure of time was too great to permit their completion and proper tuning before shipping the plane to France. A serious error was made in the design of this plane in that it was not built to land at a speed of between 90 and 100 mph

Mr. Wait, who is now Chief of Design of the Berlin-Joyce Aircraft Corporation, was engaged on the design of the racers of which he writes in this article. Beginning with the famous "Texas Wild Cat" he relates of the design improvements made on speed planes up to the present time.

An interesting point that he brings out is that the greatest increase in speed, aside from those due to increased horsepower, were obtained by modifying the shape of the nose and by developing wing sections with a lesser minimum drag and a higher maximum lift.

No such landing speed had ever been attempted before, and it was only considered possible due to exaggerated reports having been made concerning the extremely large and smooth landing fields which would be available in France. With this in view even the shock absorbing systems were eliminated from the landing gear wheels the tires being covered upon to absorb the shocks of landing. This plane was test flown in this country by Mr. Roland Rabillo, who was at this time the chief test pilot for the Curtiss Company and the holder of the world's altitude record. These first tests were made by substituting a high lift large area monoplane wing for the racing wing that plane was designed to carry. The tests were flown at Roosevelt Field on Long Island, and during these were one of the first recorded occurrences of wing flutter was observed. Rabillo took the plane into the air and crossed the field several times at a relatively low speed. He then opened the motor wide and commenced a dive across the field at an altitude of about 500 ft. As he passed overhead an estimated speed of approximately 175 or

Design



THE S. E. J. COX AND THE TEXAS WILD CAT IN FRONT OF THE VINTAGE PLANE WITH WHICH HE WON THE BELLMER RACE IN 1926.

180 mph, the wings were twisted in flame so violently that all believed that they were about to fall off. Rabillo immediately set the nose and landed. He reported that as the plane attained speed, the control stick was wrenched from his hand and the stick violently thrashed back and forth between his hands, twisting them almost in a pulp. A subsequent wind-tunnel test showed that this was due to the "lag-drag" effect of the polished aluminum on which the skinning was fitted, which were mounted directly on the leading edge of the wing and fluttered violently when the incidence of the wing reached a certain critical angle causing the air flow to no affect the aerofoil. That wing proving a failure for the above reasons, an auxiliary set of lower panels were hurriedly bolted and shipped with the plane to France with the idea of flying the plane as a biplane for our flight at Biarritz.

UPON ARRIVAL IN FRANCE RABILLO FLEW THE PLANE AND HAD A WIDER RIDE THAN HE DID IN THE AIR ON LONG ISLAND, THE PLANE BEING ABSOLUTELY INSATISFACTORILY.



THE S. E. J. COX AND THE "TEXAS WILD CAT".

Traveling at a terrible speed for those days, Rabillo passed an event of the field and attempting a landing passed completely over and landed without damage in a plowed field about half a mile distant. A new tail was hurriedly put on, mounted and completed the trip before the plane was due on the flying field for the race. Early the next morning Rabillo took off and flew cross-country to the field, where in attempting a landing he again passed over the field and crashed into a culvert which completely crushed the engine and severely injured Rabillo. There is no doubt but that this plane was fast enough to win were the men more bold if not crushed, as performance estimates made for it showed a speed in excess of 200 mph and the flight tests strongly bore out this estimate. These experiences proved the necessity of completely studying, designing, and testing a racing airplane before any attempt is made to enter it in competition. Any attempt to do otherwise must inevitably result in failure.

The next year two racing planes were designed and built for the United States Navy around the same CURTISS engine which was used in the Gordon Bennett plane, except that it was direct-drive instead of geared in the Gordon Bennett plane. These particular aeroplanes failed to realize the knowledge gained from the Gordon Bennett plane and were built with relatively large fuselages, a relatively useless wing structure and landing gear and were equipped with French Le Rhône motors. They proved to be not nearly as fast as the previous planes, showing only about 186 miles an hour

through the horsepower of the engine was 425 as against 400 in the Gordon Bennett plane.

In 1922 two strong planes were built for the U. S. Army to be flown in the Pulitzer Trophy Race at Berlin that year. The wing area of these planes was fixed, as they were primarily designed to land at 75 mph., which was the speed required by the racing rules. They were equipped with the famous Curtiss D-12 engines, which developed approximately 465 horsepower in the planes. The fuselages of these planes followed closely the lines of the Gordon Bennett race, but was laid out to be even smaller. The wing section was extremely clean, consisting only of wings, free flying wires and two landing wires; a central cabane strut and two tailored interplane struts. A new wing section known as the C-37 was used. Wing-surface type radiators were fitted and a landing gear consisting of only two struts, a cross axle and no sternwheeler wires was installed. The tail drags were simply laminated balsa spruce extending almost horizontally at the rear of the fuselage. These planes were especially fast and were probably the first planes ever successfully flown which were capable of exceeding 200 miles per hour. During the same year English planes which were made by Lawrence, Mitchell and Marconi, the pilots found them to be so sensitive that both of them reported great fatigue occasioned by flying them. On Lt. Marconi's flight he attempted to turn at high speed unmercifully over the observers at the field and completely rolled the airplane in the attempt, so sensitive was the rudder as to make it snap at such high speeds. One of these planes flown by Lt. Russell Marconi was the Pulitzer Trophy Race at a speed of 255.8 miles an hour, which was the first time any plane had ever exceeded 200 miles an hour in competition.

The next year two racers were built for the United States Navy to be flown in the Pulitzer Trophy Race to be held in St. Louis that year. These planes were considerably modified from the 1922 Army design. The fuselage was much more compact, the cockpit area was high slightly longer, and a different shape of nose was built into the cowling over the engine. An entirely new type of wing structure was used; the cabane strut

being completely eliminated and the upper wings had thin stream-line struts off the top of the fuselage. The lower wings were considerably smaller and were similarly mounted on the bottom of the fuselage. A new wing section developed in the wood board especially for these racing planes and known as the C-62 was used, and wing surface radiators were fitted. The landing gear was still further cleaned up by building the shock-absorber system into the wheels and reducing the cross axle to a very small circular tube. The front hub was also used to the center of the front wheel, thus improving the angle of the wheel and considerably reducing the load on the front wing beam, giving a lighter loss of less resistance and concentrating both the landing and flying loads at the same point in the fuselage. A novel control system was installed with a variable gearing which provided much less sensitive control of the elevators and rudder near neutral, but did not limit the full angular throw of these controls at all. These planes were equipped with Curtiss D-32A engines developing approximately 550 horsepower. They were also equipped with the first René metal propellers to be flown in competition. They were flown by Lt. Williams and Broc of the Navy, and Lt. Williams was the Pulitzer Race winner with his plane at a speed of 248 miles an hour, or about 30 miles an hour faster than the speeds attained in the race the previous year. Later on Lt. Williams and Broc engaged in a speed duel at Mitchell Field, Long Island, in an endeavor to set a new world's three-kilometer speed record. At that time diving was permitted during such contests, and during this duel Lt. Williams finally set the record at over 200 miles an hour by diving into the course from a height of nearly 10,000 ft. In 1925 new racing airplanes were built jointly by the Army and Navy. These planes identical in all respects, were modifications of the type built for the Navy in 1923. They were equipped with Curtiss V-1400 motors, developing approximately 600 hp. and equipped with a crank-shaft extension which permitted a better streamlining of the nose of the fuselage. A new forged steel main landing gear was used, and the interplane and wing radiators were the same as used by the 1922 craft, the exception that a new wing section was used. It had been developed particularly for these airplanes and was

known as the C-80 section. During the course of these tests eleven different wing sections were tested on the model, each one being a modification of some preceding series. These planes were flown by Lieutenant Williams of the Navy and Beirne of the Army, and attained a high speed in level flight in excess of 250 miles an hour. Lt. Beirne was the Pulitzer Trophy winner with his plane at a speed of 245 miles an hour in the year at Baltimore, Maryland, by Lt. Crookshank and Orliss, of the Navy and DeBennett, of the Army, in the Schneider Trophy Race which Lt. DeBennett won from Great Britain and Italy. A day or so later Lt. Dougal set a world's three-kilometer record for airplanes with his plane, attaining a speed of 245.7 miles an hour in level flight.

In 1936 the same airplane was equipped with a new version of the Curtiss V-1400 motor known as the V-1530 and developing 750 horsepower. Production of a new shape was timed and a set of new cowls were built around the new engine permitting a better shaped nose to the fuselage. This plane was flight tested at Port Washington, Long Island, by the late Lt. Conner, during which he set a record of 248 miles an hour over a measured course a excess of 250 miles an hour. While en route to Norfolk, Virginia, on this year's Schneider Trophy Race, Lt. Conner was unfortunately killed in



First Aces with the Pulitzer Trophy and the United States Navy plane which won it in 1925.

same airplane as a landplane was estimated to have a high speed in excess of 270 miles an hour.

From the foregoing it will have been seen that a series of airplanes were built around practically the same airframe, of approximately the same weight and were new and with only minor modifications, showing high speeds ranging from approximately 200 miles an hour to over 250 miles an hour. In the last four years there has been through the refinement in design of both airframes and engines. The greatest increase in speed, aside from that due directly to the increase in engine horsepower, was obtained by modifying the shape of the nose and by developing wing sections with a lower maximum drag and a higher maximum lift. Such increases were due to improved curving, cleaner fittings, lighter structures permitting relatively smaller wing structures and the general cleaning up of the minutest detail of the airplanes.

When the British and Italian races first came to this country in 1923 the airships were good, but the detail design of the planes had not been carried to the extremes of cleaniness of the American entries.

The next year was a different story. The Italian set over a fleet of racers that were related to the last designs. There did not however, seem to be much forward progress made, and as a result the Americans won the race handily. The next year the British also produced racers, built by two separate firms, that were marvels of cleanness and refinement. The engine manufacturer had worked with the airplane builders, and the combination produced racing airplanes that in detail design will be hard to equal. As a result the British won the Schneider Trophy that year.

Each year speeds are reaching higher and higher, and that each year added emphasis is laid on the necessity for cleaning up the lot of parasite resistance, as it is useless to hope to attain higher speeds by a mere increase of power alone. The power increase necessarily requires more fuel and larger engines, and the resistance increases as the square of the speed. It is therefore evident that to increase our present speeds appreciably we must cut down the resistance of the planes by a constant endeavor to eliminate even the minutest details drag and to design our engines to obtain the maximum power with the minimum of frontal area and weight.



Major DeBennett standing beside his Curtis racer with which he won the Pulitzer Trophy in 1925.



Curtiss V-1400 as entered in the 1925 Schneider Cup Race.

THE Los Angeles Races

ONE YEAR AFTER

By CHARLES F. McREYNOLDS

MORE than 200,000 people paid admissions to the 1938 National Air Races at Mines Field, Los Angeles, an average of about 25,000 people daily for the six days during which the show lasted, and it was estimated that a total of approximately 3,000,000 people viewed the aerial events from points of vantage outside the field proper. This is said to be the greatest mass of people that has thus far been brought together to view a single series of aerial events. Coming as it did a little more than a year after Lindbergh's flight to Paris, and on the heels of the enthusiasts who continued to mount with his America Tour, non-stop flights Mexico City, and Pan-American Good Will Team, last year's air race program was the logical climax of the extraordinary interest in aeronautics which dominated aviation activities during the latter portion of 1937 and much of 1938.

Surpassed by no single event of like publicity in the California newspapers, the 1938 air races proved to

be the greatest single factor in crystallizing an enthusiasm held throughout southern California that had manifested itself since the start of the move for aviation. It was the first time that Aeromarine Expositions had been staged in conjunction with the races, and the public took full advantage of the opportunity to walk up aviation here.

Nevertheless, a year after the 1938 events, many people are still asking whether or not they were successful. It is hard to answer such a question offhand, for it is so difficult to measure the success of such an affair, difficult to know the real significance of the halo-aesthetic pattern of mass and show exhibits, their relation to the attending crowd and the resulting benefit to the aviation industry.

From a financial standpoint the 1938 National Air Races were a decided success. The Air Race Association broke even on the cash accounts, and an net lost very money. Many of the exhibitors, however, were forced

to charge off heavy expenditures to advertising. The 1938 show was not a selling show and some firms were disappointed by the lack of cash customers for their products. But the time was not ripe for sales. The public came to be shown, as outsiders seeking to learn the what of a new industry and as potential purchasers of this plane or that.

Rather than making aerial sales, the great lesson of the 1938 show was laying the ground work for the steady expansion which has followed. Many firms passed pneumonia overnight, and the industry learned to meet such causes as Warner, Kinner, Aerocar, and Lockheed. Young organizations made initial contacts with large Eastern firms interested in the air-expansion of another California, and strengthened their sales and service representation in this territory. Had the 1938 events accomplished nothing more, they would have been a crowning success for the manner in which the industry was made conscious of the possibilities of the West, in the innumerable advantage of that section during this past year, as records covering any phase of the industry's growth will readily demonstrate.

OUT OF THE INVENTORY of data and information covering all phases of the 1938 events, one phenomenon stands out clearly above all the rest in the light of later developments. For nine days the spectators witnessed the series of "Pit Blowers" and "Machinists," held their breath while delayed-opening parachute drops were staged, and screamed hysterically when soaring biplanes and diving bombers roared down on the stands at 300 mph and during that time the air base and service flight operators reported an almost stampede in traffic. Army pursuit planes too closely resembled the ordinary three-place commercial biplane for the average man, and he left the day's races with increased respect for the capabilities of aircraft and a vividly increased desire to remain a spectator to all race activities. This sentiment continued to grow after the air races were over, and it was not until early in 1939 that seeing flights recurrently drew a sleepless night or by the very events which made the success of those early popular.

However, on Sunday, Sept. 16, the ninth and last day of the races, there occurred a notable business-building incident which was in a way entirely separate from the air race program. With approximately 30,000 spectators jamming every point of vantage; for a view of the

Abbildung eines der "Three Stooges" während einer Show.



Platz für die 1938 National Air Races, in Anzahl von grandiosen und spektakulären Vorfällen auf Mines Field, Los Angeles.

showing events there was staged a "parade" of nine bienged Ford Trimotors and 15 Ryan Broughams flying in single file, these 24 large transports having passed above the crowded stands in steady and silent formation, silently solemn fuselage when compared to the noise of the small planes which had been holding the public's eye for nine days, and as each plane passed above the crowds, showers of flowers were scattered everywhere by ears than 100 young Hollywood picture beauties who were heartily enjoying the flight. Soon the planes landed, taxied up to the stands, and the girls gaily clattered out for introductions, later to re-enter the planes and fly back to the home port.

It was a great "burst" and a clever plan of dissemination on the part of Jack Madsen, whose company furnished the aircraft, that the immediate reaction of the public was that they had had their first taste for their new enthusiasm for aerial activity. Much of the success which has since attended Western air transportation during the first seven months of 1939 must be credited to the education generated by the air races and crystallized by that parade of large, steady-flying commercial airplanes. A large percentage of the public thereafter looked forward to flights in planes of the large transport type, and with the arrival of cool flying weather in the early spring of 1939 their desire was soon satisfied.

An travel over established lines flying long-haul equipment has increased amazingly since January of this year. With a paid-up passenger list of approximately 4,000 for January, the transport lines have expanded so rapidly that 6,000 pay passengers were carried in and out of Los Angeles during the month of July over regularly scheduled lines. There were three additional mainport lines in January, and in July there were six operating out of Los Angeles. In January there were six unengined planes operating either out of or into Los

Anglo terminals daily, and in July there were 28 daily. In January there were but two air terminals used by tri-engined transports and in July there were four such terminals, at one of which four different air transport companies were operating. Some flying has been inaugurated by the large transport companies and is increasing with real success. During the evening when this is being written, six different tri-engined transports have flown over Los Angeles to give sightseers a view of the city at night.

At the present time traffic over the established air routes is in the power of the aviation industry. If the public is to fly at all it will first fly over regularly scheduled and safely operated lines. Thereafter the passengers of such services may be counted as boosters for the further advancement of the aviation industry. Profits must be earned by the air lines, planes must pay profits on the investments placed in them, or there will be no reason for an aviation industry. The fact that Los Angeles airlines are carrying almost 10,000 passengers a month over regular air routes, exclusive of charter parties and scenic flights, that several of the transport companies are already reporting profits and traffic mounting rapidly, and that much of this air line passenger must be credited directly to the influence of the 1938 Air Races, should prove for all time the real value

of those events. Not only is such air line activity of value to the immediate territory within which it is conducted, but the success attained must be an inspiration to the whole industry, and the lessons learned and methods developed through handling such a volume of traffic must prove valuable as a foundation for expansion elsewhere.

MANY OTHER RESULTS of the 1938 races are evident in the generally increased activity, but it is not possible to discuss fully the various areas where the event has had considerable influence. For instance, the general aviation man which follows the news made it possible for the California Aircraft Operators' Association to build up a strong organization which has influenced the trend of aviation legislation in the State of California. As a direct result of this organization's efforts, the Illinois Bill has been made a state law, and it will hopefully be illegal for any plane or any pilot not Federally licensed to operate within the state. This law substantially wipes out several hundred war-time planes which should long since have been passed, and while some present handling will be affected, the ultimate result will be vast good for the progress of aeronautics in this state and throughout the country. Other evidences of the benefits brought about by the races are seen in the 1939 history of

the Southern California Chapter of the National Aeromobile Association. Prior to the 1938 races this group had been fairly active but always quite small. A reorganization was effected shortly after the air races and for the first five months of 1939 there were a total of 2,300 persons present at the five monthly banquets, approximately 1,000 being present from the Los Angeles Aviation Club, officials of the races, the Los Angeles Junior Chamber of Commerce which has declared "an major effort for the year 1939 in advancing aviation in southern California, chiefly as a result of



The Photo Students' of the 1938 races did
by Robert Hougham in place 14

airports are under development, in addition to the fact that great improvements have been made at literally dozens of smaller airports throughout southern California.

It is evident that many great benefits may be singled out to show how the 1938 National Air Races have helped southern California. It is not so easy to point out the ways in which the air races helped the industry as a whole, but the benefits have been many, the least of

which is the great prestige which has given the local market to the advantage of the industry generally, and in some cases fame and fortune were brought to the groups manufacturing planes or engines which won favor at the meet.

Probably the big factor, naturally, is the demonstration of a real need for an annual program of progress which will clearly mark the passing milestones of each year's advancement in aviation. It has become rather well established that a large selling and introductory show should be held each spring before the real opening of the real selling season, at which time factors will accommodate their stands for the public's convenience, will stimulate their organizations for the coming effort. But it is just as important, for the good of the industry, that a great show and air race program should be held at the close of the season in order to display definitely the capabilities of planes which have been tested by a season of use, and to indicate the relative popularity of existing types, so that engineering departments may avoid laboring through the winter to improve what has failed to find favor with the flying public.

The 1938 National Air Races and Aeromobile Exposition obtained a period of great popular curiosity about aerospace; now we look for the 1939 Cleveland Show and National Air Race program to obtain the greatest business year that aerospace has yet enjoyed. In 1938 we learned that we were going ahead with an undivided public interest in the progress of aviation, but at the close of the coming show we should know more clearly than has yet been possible where we are going with the aviation industry.



EXHIBITION OF SCENICALLY RATED TO THE MEET BY THE EXHIBITION

DO AIRPLANE RACES

Stimulate AIRPLANE

By E. M. LAIRD
President, E. M. Laird Airplane Co.

LIKE EVERY INDUSTRY that offers something new to the public, we of the aviation business have a double selling job. First, we sell planes to an aviator-industry that must sell the use of our products. Only after this has been accomplished can we hope to individual manufacturers to sell airplanes.

Airplane races are an important factor in accomplishing the first step of the industry's sales program. Airplane races are the circus-parade of the airplane industry. They are the means of dramatizing our work. More printer's ink and conversation are expended on a new coast-to-coast record flight than on all the millions of miles flown through fog, storm and cold by scheduled airmail, express and passenger lines.

We cannot complain of our progress. Undoubtedly the public is becoming air-minded. But it is not yet air-enamored—and there is a vast difference. The most courageous who buy an "aerial pony" to ride about the little trip up a German highway or to farm planning the purchase of a plane for his own use or even from using an established reliable air-passenger line

consequently, airplane races still have a very distinct purpose. They make it possible for aviation to impress the news editors of the daily papers—where John Jones can digest the latest aeronautical news together with his bread and eggs and his market reports. Air races provide the public which enables the layman to grasp and remember names of manufacturers, names of pilots, the speed, safety, and special characteristics of airplanes, etc.

So much for the indirect value of air races to publicity seekers. They also have direct and immediate fruits. For one thing, they attract crowds in the flying field, where the public can see the everyday business of aviation in progress. They can watch the air-mail stage wagons with rolling drivers until the post-office truck has dashed up and transferred its load. When the truck has not yet cleared the field, they can see the ship already disappearing over the horizon.

They can see the sky-boomers take off and land with their passengers as rapidly and successfully as railroad trains. Mrs. Jones, when she has watched this very common-place procedure several times, is much less likely



Laird "Speedy" of the type used by Speedy Wilson to clinch the Southern Speedy Race.
Note the special low wind-resistance landing gear.

SALES?

to object when hobby enthusiasts take a business trip via airplane.

Another thing—Few airplane dealers can at yet expect a volume of business which justify a centrally located display room. Except for aeronautical exhibitions, their only chance to exhibit their plane is to bring the public out to their airport hangars. And races do draw the crowds!

It is well, here, to sound a note of warning. Every airplane accident offsets the beneficial effect in the public mind of a thousand successful flights. Let's have no accidents! Thrills, yes. The crowd expects thrills. But the crowd can be made to understand that most flying is in no way a part of an amateur's sport. And the airport management can do much (by assuring clearly the responsibilities of race managers and in placing and rigidly enforcing strict rules) to prevent all possibility of mishap during races.

What has been said so far, covers only the value of air races as a means of educating the public. For the winners, at least, there is always a gratifying reaction when the trade thinks it is so courageous as participants!

I speak from experience. After winning one of the more important races recently, we office received letters and telegrams from every corner of the country, inquiring about price, delivery date, etc.

The inquiries came from two distinct groups of prospects. These are the sportsman-speed fans. They like to know that they won a winner—that they can outstrip anything in their class. An airplane appeals to the sportsman-pilot like a thoroughbred race-horse—and he takes the same personal pride in its speed and performance.

Many inquiries also came from professional pilots



Above: E. M. Laird, president of E. M. Laird Airplane Company. Below: a group which has been making records with Laird planes. Left to right: Anthony Macomber, airmail pilot; John C. H. Laird, E. M. Laird's son; C. W. Reichenbach, pilot; and Frank Larrivee.



Nearly every new airport is dedicated with speed competitions offering lucrative cash awards to the winners. With airports being opened almost weekly, the pilot of a fast plane can quickly win back the purchase price of his ship. To have a fast airplane is a good living.

In this country, where no government subsidy settled the infant aeronautical industry, the cash awards given by aircraft race committees did much to aid its growth. Air races have been, and have not yet ceased to be, useful—provided, of course, that they are carefully and carefully managed.

Spinning Tests To Be Considered

Some Say Requirements No Longer Is Necessary

(CLEVELAND, Ohio)—Spinning tests for commercial aircrafts which have been required by the Civil Aeronautics Board since 1946 are to be discontinued by commercial airplane manufacturers during the industrial meetings of the Association of Commerce here, Aug. 26-28. The present requirements, which have provided that no plane weighing less than 4,000 lb. must be tested in a spinning test,

The plan must be sent into a sign for the fall term before the test can be strength in front of one of the violent maneuvers.

The place most likely to return to normal flight after one and one-half additional spinning tests with the controls neutral is the power off.

To Continue Some Requirements

Some manufacturers contend that this requirement may now be unnecessary as view of the fact that the design and construction of airplanes made since the tests were first applied. The trend in commercial airplanes has been toward greater stability, with no need for planes to spin under normal conditions.

The spinning test and success of other related provisions concerning the development of airplanes along maximum safety lines will be determined by the manufacturers during the Association of Commerce meetings, and in joint conference with Department of Commerce officials.

The spinning test, along with the maneuvering during their preliminary meetings will be voluntary, as officials of the Department of Commerce, September 2, at a joint session of the Department of Commerce and the Association of Commerce.

The joint meeting will be the first held under the new Code of Procedure drawn up by associations through the American Standards Association. It was approved in principle by Brig. Gen. George M. Young, director of the Aeronautics Branch of the Department of Commerce. The code was drawn up when the maneuvering test was highly popular, so that regulation governing aircraft to be placed in form areas specified date is liable to cause some specified date and design in conformance with the latest requirements.

Code Date for Change

The new code provides that "unless it is consistent with the rapid progress in design, development and production, any change in the code or its interpretation, or in the manner of applying the code, shall be issued not less than a year and on a definite date, preferable January 1." It further provides that the requirements be revised in a preliminary form for study and discussion at a joint meeting of the Department of Commerce and the Association of Commerce.

Oakland Has Jumper's Club

GARLAND (Mass.)—Designing out to wait for an emergency to introduce them to the art of jumping, a group of 100 pilots of the New England airport here have organized the High Jumpers Club. Walter Hall, chief expert, a jumper and their instructor, while Ray L. Jones, former pilot, is vice president and Harry Shirley, treasurer, Secretary Shirley jumped twice after taking

Investigate Liquids For Instrument Use

WASHINGTON (UPI)—In co-operation with the National Aviation Committee for Aviation, the Bureau of Standards has been obtaining experimental data on liquids suitable for use as aircraft instruments. At present, liquid helium, liquid air, liquid nitrogen and liquid immiscible. Artificial balloons of the latter type depend for their operation on liquids having the same characteristics which are found in the atmosphere.

After giving due consideration to the factors of insusceptibility with time, low volatility, constancy of index of refraction, and transparency for varying temperatures, the Bureau found that they were obtained on the freezing point and on the viscosity in the temperature range -30°C. to +70°C. The latter property is of primary importance in the use of liquids as aircraft instruments.

The recommendation of the Bureau should be -40°C. or lower since aircraft instruments may be subjected to low temperatures during the ordinary service life.

Measurements of the viscosity were made on solutions of animal, vegetable, and mineral oils in various glycerins in dilutions of 10 per cent. They were obtained for individual liquids, such as kerosene, gasoline, styrene, and carbon (mineral) oil. These data are published in Technical Report No. 296, which may be obtained for \$2.50 from the Superintendent of Documents.

Federal State Aircraft

The object of the investigation was to find a liquid or liquid gas which had a relatively constant index of refraction and temperature coefficient of viscosity. A criterion for comparing the liquids in this respect is arbitrarily selected as the temperature at which the viscosity is unity. For most paraffins this is from the lower temperature limit of usefulness. No liquids with an absolute viscosity greater than 0.05 poise at 25°C. are used for what is called "dry" insulation to resist heat loss, and some at absolute viscosity of about 0.025 poise with the temperature below -30°C.

At present, work is being carried on, first, in extending the lower temperature limit of the data to -100°C. and lower, and second, in obtaining data on promising liquids and solutions in an effort to find ones with a viscosity below 0.005 poise at 25°C. which are stable at temperatures down to -40°.

Expect to Turn Out First Comet by Nov. 1

MADISON (Wis.)—New equipment and experience in a factory with 30,000 sq. ft. of floor space, and the supervision of G. Hobart MacLean Company, is the set-up which Comet Engines Corporation is going to work here to produce the first comet engine, says W. Williams, president of the company. It is expected that the first engine will be ready for delivery about the first of November.

John H. Glavin, for many years aircraft engine experimental engineer for the Army, and the Navy is in charge of engineering.

A Comet engine runs automatically, and can be stopped almost at any time during the day in the new plant, and then started down and sometimes "woken up," declares Mr. Glavin.

Mid-Confidence Interval to Area

LOS ANGELES (UPI)—Statistical analysis of a stock interval in Mid-Confidence Area by Avia Corporation of California has been completed by Dr. Hugo L. Hirsch, director of the test equipment. This strengthens the close co-operation between Mid-Confidence, which will soon begin operation of facilities there, Duane C. Kinnard and David P. Phillips, vice presidents of Avia Corporation. Louis H. Siegraves, president of the later firm and also of United Bombers, will be elected to the board of Aeronautical Industries, as well as Arthur Johnson, who heads United States & British International Company, Ltd.

Air Firm Holdings to Founder

NEW YORK (UPI)—Statistical stock interval in Mid-Confidence Area, Inc., Los Angeles, will be taken over by Avia Corporation. Louis H. Siegraves, president of the later firm and also of United Bombers, will be elected to the board of Aeronautical Industries, as well as Arthur Johnson, who heads United States & British International Company, Ltd.

Doctor vs. A.S.P.A. In Re Flights for Deaf

NEW YORK (UPI)—Controversy has resulted from the publication of results from tests conducted by the American Society for Prevention of Accidents, which relate closely to the use of aircraft instruments, all present being blindfolded and in complete compression and lateral immobility. Artificial balloons of the latter type depend for their operation on liquids having the same characteristics which are found in the atmosphere.

After giving due consideration to the

factors of insusceptibility with time, low volatility, constancy of index of refraction, and transparency for varying temperatures, the Bureau found that they were obtained on the freezing point and on the viscosity in the temperature range -30°C. to +70°C. The latter property is of primary importance in the use of liquids as aircraft instruments.

The recommendation of the Bureau should be -40°C. or lower since aircraft instruments may be subjected to low temperatures during the ordinary service life.

On the other hand, Dr. Paul V. Winslow, air supervisor of the 380 Park Avenue, New York, who is responsible for aircraft instrument safety, believes that the only possible improvement might be in terms of psychological devices, and that it would be only temporary.

Continental Motors Farms Engine Firm

NEW YORK (UPI)—Organization of Continental Aircraft Engine Company as a subsidiary for the purpose of manufacturing and developing auto power plants, to be headed by Louis W. Smith, president of Continental Motors Corporation. All of the 250,000 shares of common stock is held by Continental.

W. B. Angell, chairman of the

parent company, Robert Bradley, who has headed development work, as vice-president, R. H. Haase as treasurer, and T. C. Knott as secretary, the new firm will have a special staff.

Art parts have been completed for the company's Model A-160 160-hp radial engine, assembled by C. P. Smith, automobile manager, with one of the pieces, the cylinder head, having been machined and honed for the first time. Art had formerly been supplied. Among the known assets, it is generally believed that many sharp or serrated angles, such as between wings and fuselage, and between the engine and nacelle, often cause failure in moving parts. Such needs were as stated above while others are compensated to the extent that progressive rotation of the engine does not damage the parts of the part. In the tests, specimens were made up of standard types of steel and aluminum heat treatments. Shear and fatigue tests will cover the remaining types.

The different methods and plotting methods on fatigue factors also will be considered.

To Teach Aeromarine Law

MINNEAPOLIS (UPI)—A course in air law will be offered by the Minnesota College of Law in the new fall semester. Henry C. Dostert, dean of the college, said the course will be taught and will be presented after a similar course being taught in Germany. Franklin D. Gay will be instructor.

Bendix Establishing Base at Los Angeles

LOS ANGELES (UPI)—Bendix Corporation has established a research laboratory with total assets of more than \$10,000,000 to be established in the city. New 1, when Bendix Aviation Corporation becomes independent of the Bendix Corporation at 12th and Main Streets, according to E. H. Moore, director, according to H. E. Lester, Pacific Coast manager for Bendix. All management interests of the American Motor Systems, Inc., Div. of the Bendix Corporation, will be transferred to the new laboratory, and all technical interests will be moved to the new building. Other companies which will occupy offices, display or assembly space in the building are Bendix, Republic Motor Company, Sierra, H. H. Rollins Aviation Company, New Orange, Calif., Stromberg, Warburton, Co., Clinton, Iowa, Smith-McCormack Corporation, County-City Trucking Company, and Poston Investment Company of Brooklyn, N. Y.; James P. Marsh Company, Chicago, and Tidley Motor Company, Newark, N. J.

To Study Notch Failures

WASHINGTON (UPI)—A series of model aircrafts will be built to study notch failures in ligament failures, possibly caused by the notched edges of the wings of aircraft. The Bureau has been among the first to investigate fatigue fatigue of control rods and tail booms, and has now begun to study notch failures which have apparently been suppressed. Among the known assets, it is generally believed that many sharp or serrated angles, such as between wings and fuselage, and between the engine and nacelle, often cause failure in moving parts. Such needs were as stated above while others are compensated to the extent that progressive rotation of the engine does not damage the parts of the part. In the tests, specimens were made up of standard types of steel and aluminum heat treatments. Shear and fatigue tests will cover the remaining types.

The different methods and plotting methods on fatigue factors also will be considered.

Tow Challenger Comes Back

WICHITA (KAN.)—Tow Challenger power plant carrier wing monoplane has been named and will fly again according to various types and class of aircraft. An description of these ratings was published on page 220, Aviation, general manager.

Will Offer Teachers' Course at New York U.

NEW YORK (UPI)—Through the cooperation of the Daniel Guggenheim School of Engineering on the campus of the Massachusetts Institute of Technology, New York University will offer a special six week course for teachers for aviation ground schools, beginning Oct. 14. This will be aimed to aware to the course members of the principles of the University flat courses, but will be concentrated on air ways in that flying schools may allow room of their personnel to show.

Students will have specially designed to enable the students to pass the Department of Commerce examination for a general class teacher's license, and will include auto mechanics, aircraft mechanics, and aircraft navigation.

The course will be taught by a number of experts in the field of aircraft education.

Bugs zenith Altimeter Rights

MIDWAY CITY (Calif.)—Purchase of manufacturing rights covering the zenith Altimeter, invented here, by Safefield, Inc., of America, has been announced by "Dad" Morgan, president. The Safefield company has also taken over Harry C. Miller Company, maker of the "Safe" radio car and speed limit and will continue the production of these engines while experimenting with a series of aircraft engines. Harry C. Miller Company has been granted the right to manufacture aircraft engines employing two opposed heads of base cylinders each and it is understood that experiments will be conducted with this engine as well as other types. The Safe radio car, the original product of the Miller Motor Company, will continue as did engines with the new company. Others involved are Joseph of America and his daughter, Margaret, and George Schmid, vice-president.

New Transport Ratings Soon

WASHINGTON (UPI)—An announcement is made here by Charles M. Young, director of the Aeronautics Branch, that the Bureau of Standards is preparing the Transport Rating Service. According to Young, the Bureau will be responsible for licensing according to various types and class of aircraft. An description of these ratings was published on page 220, Aviation, general manager.

Sanction Class B Show At Los Angeles, Nov. 9-16

DALLAS (UPI)—Four of the new Fairchild Model 83B-36 planes, first-place craft in the New Whitford Free Power class, have been acquired by Stone Mowers at the southern Fairchild Aircraft plant. Contract work here, the planes will be used as demonstrators.

Detroit Tool Firm, merger announced

DETROIT (UPI)—Two firms have merged: Wayne Tool Company and H. E. Krueger Company—so as to be acquired by The Airport & Tool Corporation, recently organized by the two men. The new firm's stockholders are the same, according to Joseph W. Krueger, manager, leading to Wayne interests. It is claimed that approximately 80 per cent of the present business of these firms, which are tool and machine manufacturers, is in the aircraft industry.

As experimental designs carry the development of new type tools has already been started.

Officers of the California Aircraft Reparation Association, which screened the nominees for the show, are, president, Fred A. Winkler, sales manager for American Aircraft Engines Company; vice-president, Harry Weller, vice-president and general manager of the Douglas manager; vice-president, Waldo D. Watters, manager of the Los Angeles Municipal Airport; secretary, G. M. Menzel, president of Midwest Aircraft Corporation; and secretary Frank Castle, director of the aviation committee of the Los Angeles Junior Chamber of Commerce.

Commercial-Air Discontinues 6X

LITTLE ROCK (UPI)—Presentation by Commercial Air Lines, Inc., for August will include seven GL-powered planes—these to be the last aircraft turned out by the firm using that engine.

New Wright Fee Powers One-Wheel Loening



A view of the monowheel Loening being tested at Muncie Field. Landing gear retraction is eliminated in the new design, with the wheel stationary and the wing tip protected by slant nosewheel covers of the old Jenny. The plane is powered by the new 300-hp Wright twelve-cylinder air-cooled inverted Vee engine. (A description of the one-wheel boat development will be found on page 46, Aviation for July 6, 1939.—Ed.)

AVIATION August 20, 1939

Mother Crosses Nation In Refining Flight Test

NEW YORK (UPI)—The Americans go home, the "Hollywood Star God" and his last here on its return trip in an effort to consider a remaining number of remaining scheduling details. The principal members of the flight, arraigned, placed by H. R. Männer and Art Walker, was reflected on the way home from Spokane at Ottumwa, Calif., Rock Island, Ill., and Cleveland, Ohio.

The trip from Spokane to New York took 5 days, 19 hr., 30 min. That was considerably longer than had been expected due to the fact that the plane ended all day with the engine, had to stop for a rest and repeated rough weather between Denver and Cheyenne. The average speed he never contacts was about 75 m.p.h.

Remaining over the western cities was the purpose of the tour, which included Alas-

ka, Denver, Salt Lake City, and

New York by arrangements made by Texas DE Company, whose products have been used throughout the trip.

The final leg of the traveling plan was completed by C. G. Tracy, Waukegan, Ill., P. V. Dailey, who conducted the refueling plane which made contact with the "28 Last Rollin," an ocean-crossing biplane flying endurance flight.

Next Safety Congress Will Study Air Hazards

CHICAGO (UPI)—Safety problems of the air will be the subject of two conferences during the sessions of the Eighteenth Annual Safety Congress to be held in this city Sept. 30-Oct. 4. Sessions will be devoted to the following: the safety factor in flying; Specific subjects to be considered are Aerodynamic Safety, Maintenance, Fire Protection, Weather, Aerodynamics, Pilot Training, and Faculty Hazards.

An Accredited Section of the National Safety Council has been formed with E. L. Miller, editor of *Aeronautics* as chairman. The section will operate under the chairmanship of Harry F. Duggenberger, president of the George Bush Fund, but as its other members Hermon Ferguson, president of the National Safety Council, and Captain Charles Davison, Associate Secretary of War, D. S. Ingalls, Assistant Secretary of the Navy; William P. MacCracken, Jr., Assistant Secretary of Commerce; Mr. Harry A. Rinker, President of the National Safety Council.

Cincinnati Plane Show

CINCINNATI (UPI)—Announcement of a large amateur private show to be held at the Cincinnati Municipal Airport, 1939, was made recently by Warren Street, chairman of the aviation committee of the local Chamber of Commerce. It is planned to emphasize new products of manufacturers all over the world.

AVIATION August 26, 1939

Austin Negotiating With Soviet

CLEVELAND (UPI)—Negotiations with the Soviet Government for construction contracts in Russia have been opened way by The Austin Company, this city, according to President W. J. Austin.

Fifteen of Thirty-Two Engines Tested Failed

WASHINGTON (c 2)—During the week ending Aug. 17, four new approved type certificates for airplanes were issued. According to model, type, power plant, weight limit, and other factors, the new types are as follows: No. 134—Stinson SM-2-AC, four-place cabin monoplane; New Whitford Seven, 134-B, 340 lb. weight limit, four-place open biplane; New Whitford, Five, 360 lb. weight limit, five-place open biplane; New Whitford, Six, 385 lb. weight limit, six-place open biplane; New Whitford, Seven, 135-B, 340 lb. weight limit, six-place open biplane; New Whitford, Eight, 135-C, 360 lb. weight limit, six-place open biplane; New Whitford, Nine, 135-D, 360 lb. weight limit, six-place open biplane; New Whitford, Ten, 135-E, 360 lb. weight limit, six-place open biplane; New Whitford, Eleven, 135-F, 360 lb. weight limit, six-place open biplane; New Whitford, Twelve, 135-G, 360 lb. weight limit, six-place open biplane; New Whitford, Thirteen, 135-H, 360 lb. weight limit, six-place open biplane; New Whitford, Fourteen, 135-I, 360 lb. weight limit, six-place open biplane; New Whitford, Fifteen, 135-J, 360 lb. weight limit, six-place open biplane; New Whitford, Sixteen, 135-K, 360 lb. weight limit, six-place open biplane; New Whitford, Seventeen, 135-L, 360 lb. weight limit, six-place open biplane; New Whitford, Eighteen, 135-M, 360 lb. weight limit, six-place open biplane; New Whitford, Nineteen, 135-N, 360 lb. weight limit, six-place open biplane; New Whitford, Twenty, 135-O, 360 lb. weight limit, six-place open biplane; New Whitford, Twenty-one, 135-P, 360 lb. weight limit, six-place open biplane; New Whitford, Twenty-two, 135-Q, 360 lb. weight limit, six-place open biplane; New Whitford, Twenty-three, 135-R, 360 lb. weight limit, six-place open biplane; New Whitford, Twenty-four, 135-S, 360 lb. weight limit, six-place open biplane; New Whitford, Twenty-five, 135-T, 360 lb. weight limit, six-place open biplane; New Whitford, Twenty-six, 135-U, 360 lb. weight limit, six-place open biplane; New Whitford, Twenty-seven, 135-V, 360 lb. weight limit, six-place open biplane; New Whitford, Twenty-eight, 135-W, 360 lb. weight limit, six-place open biplane; New Whitford, Twenty-nine, 135-X, 360 lb. weight limit, six-place open biplane; New Whitford, Thirty, 135-Y, 360 lb. weight limit, six-place open biplane; New Whitford, Thirty-one, 135-Z, 360 lb. weight limit, six-place open biplane.

While detailed cost data are not yet available, it is believed that production costs for the 135 series will be well within the range of \$10,000 to \$12,000 per thousand cubic feet of biplane. This is the lowest figure at which biplane has ever been produced, so far as is known to the Bureau. Only a single unit of the 135 series has been produced, and the second unit is anticipated, in the near future, the initial capacity of the plant will be fit in excess of present Government requirements. The 135 series is the first airplane to be produced with radial engines, and the second unit is anticipated to be delivered by the Department of Commerce.

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■ AIRPORT CONSTRUCTION PROJECTS ■■■

E. T. Gads, Inc., Peoria, Ill., has been awarded a \$200,000 contract from the business section for development of an airport. About 120 acres will be developed at once according to plans drawn by the Illinois Commerce Commission. Two runways, 5,000 feet long, will be built and steel heated hangar accommodates between 12 and 20 planes will be constructed. It is hoped that the field may be dedicated by November 11.

Midway Air Express has bought 600 acres near the Midway Airport in Chicago and expects for development as a general park in the services operated by W.A.T. and Mid-Continent Air Express. Construction of the first phase of the hangar, the field to be land-spared, hangars, storage areas, and red, white and blue flowers form the mode of treatment.

A 10,000 passenger hangar has been completed on the site and the second will be completed by the end of October. The hangar which is to be erected at Midway by the use of the Goodyear design, this winter is being designed for the Florida, New York and European markets. The first two transoceanic flights from Key West, as present, are expected by the Port Everglades Terminal Company.

South Mills Black Works

Improvements totaling \$100,000 are planned at Midway Field, Chicago. The facilities reworking in the form of hangars, widened drainage facilities, relocation of fuel tanks and additional lighting and other areas. There have been applied for \$100,000 in aid of additional hangar space and the transoceanic flights from Key West, as present, are expected by the Port Everglades Terminal Company.

South Mills Black Works

The Carter Flying Service has completed the Miami Municipal Airfield and the plan for a \$300,000 terminal building at the Miami Airport have been completed. It will be used as a base for charter flights. East Coast Avistar, Inc., has completed its regional and intercity stages at Miami Field. The new terminal and related hangars at the Miami Airport will be completed in about two months.

Announcement of a new 222-acre airport located approximately two miles northwest of El Paso, Texas, has been made by Alvarado J. Barnes, president of the California Flying Club, which is developing the project. It is said that the field will cost \$200,000 and will include a paved landing field 5,200 x 2,000 ft. with a 150 x 150 ft. ditchless, portable hangars, repair shop, dispensing station, fuel tanks, and a control tower. The California Aviation Club has been organized with Howard J. Barnes as president, George E. Read, vice-president, and Robert "Bob" Blair, technical supervisor.

Alaska Airlines Improvements

The Alaska Airlines Company is preparing to improve the Anchorage (Tustumena) Airport having obtained a 300-acre site in the field from the Anchorage City Council. It is estimated that two more large hangars will be built and another runway will be installed, making longer flights and three gates at port. The field is located in the hills and boundary lights are to be installed.

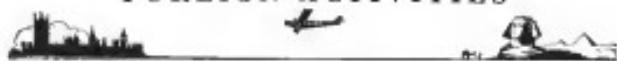
Universal Air Lines has sold its service rights at West-Central Airways, Inc., to the Anchorage Field from the Anchorage City Council. It is estimated that two more large hangars will be built and another runway will be installed, making longer flights and three gates at port. The field is located in the hills and boundary lights are to be installed.

Contracts Awarded

The Boeing-Hillman Associates Corporation

Montgomery, Minn.

FOREIGN ACTIVITIES



Italy Arranges Price Scale for Post Services

ROME (ITALY).—The Italian Government has issued a circular letter to all post offices authorizing private plane operation throughout the country. A system of airport services and mail route contracts for domestic and foreign airmail have been arranged and are reported through the United States consul as follows:

Charges for ground services in connection with the landing and departure of aircraft will be as follows according to the following schedule:

(a) Standard charges—Up to 10 kg. 800 lire per kg., 10 kg. 1,000 lire, 10 kg. 1,200 lire, up to 10 kg. 1,400 lire, 10 kg. 1,600 lire. In all, over 10 kg. 2,000 lire.

These charges are as follows from airbase to airbase and are subject to a 20 per cent increase for services at night or at the discretion of the manager of the airport, artificial illumination is necessary. If a plane also departs or arrives to land again within 15 min. and the distance between the landing and take-off points does not exceed within 45 min., there is no charge for services at night or with the second departure. If a plane lands and departs the same day the total fee is reduced 30 per cent.

(b) Airplane rental. Airplane rental is subject to a minimum charge of 100 lire per hour or equivalent for each hour of flight. The rate per kg. is 100 lire, 10 kg. 1,000 lire, 10 kg. 1,200 lire, 10 kg. 1,400 lire, 10 kg. 1,600 lire. These charges cover passenger or other services of the airplane and when the airplane is used for the transport of goods, the charge is 100 lire per kg. 10 kg. 1,000 lire, 10 kg. 1,200 lire, 10 kg. 1,400 lire, 10 kg. 1,600 lire. Total fee, up to 400 kg. 800 lire.

Ground service for planes on short distances is paid for monthly with a minimum charge of 100 lire per month and the departs regardless of whether or not these are made. All government planes are entitled service free of charge, in any other planes used by commercial companies which have agreements with the government allowing them free use of the airports. Ground service charges are also waived for private owners, who house their planes in Italy, and the same are made, provided that such flights do not extend beyond the boundaries of the field and are made without passengers.

At some airports there are hangars available on a monthly basis with a maximum charge of 100 lire per month. Ramps are charged from \$12 per cent per month, the maximum dimensions of the plane being the base for determining the space required. The rate for landing space is a fixed charge of 10 lire per month.

The ministry also considers application from private persons or companies for permission to construct at airports hangars, barracks, repair shops or other buildings necessary for aviation purposes, including the construction and sale of concessions, if granted will not interfere with normal governmental activities. Requests for such permissions are made for a maximum period of one year, and the cost of the same is about \$11 per acre per month. Each application is considered separately and on its own merits.

Landing fees for planes of less than 10 kg. are 100 lire, the amount of an engine specified and for planes of more than 100 kg. are 200 lire, cost of an engine specified and two mechanics. Hangar rental charges on the same basis as the landing fees, placing the plane in the hangar and taking it out and to disassemble within the hangar if such is necessary for repair or other work.

Wrecks of Airplanes

Applications for foreign representation landing of six Indian aircrafts and with the intention of departing for some destination outside of Italy are submitted with the request that they be allowed to stay for a longer time than the stipulated period of temporary importation. With reference to certain Indian planes which bring merchandise plane abroad and land without the consent of the Italian authorities, the only legal declaration is necessary in consideration of those which attempt to leave the country without complying with the required formalities, and the same are subject to heavy fines which are levied to those operating them. India has some loose regulation of duty and commercial taxes. If such imports are necessary for the construction of aircrafts, the same are subject to heavy taxes.

Planes which bear foreign registration in connection with which Italy has no treaties are also allowed free circulation over Italian territory without making application to the Italian authorities, provided that they are possessed of the documents listed, whether these documents are issued by the Indian government or by the government with which the plane is registered. Planes operating on international routes must be included in Italy's recognition, which must apply for permission for free circulation before entering the country.

There are thirteen zones which are roughly divided to all places except Italy, and the boundaries of these zones are as follows: Zone I covers the entire frontier of Italy, from the Mediterranean to the Adriatic and is approximately 700 m. in breadth and varies from 30 to 60 m. in width.

English And French Confer on Airlines

LONDON (ENGLAND).—A conference of the British and French delegations, which promises to have considerable influence on the future development of air lines in Europe and Africa, was held recently here. M. Laurent Rydin, French Air Minister, and M. G. C. Cresswell, Director of Civil Aviation in France, and Lieutenant Gen. de Dugue, England was represented by Lord Thesiger, Secretary of State for Air, and Sir S. J. Savory, Undersecretary of State for Air.

According to the terms of the conference, while dealing with general points of co-operation, dealt specifically with some form of re-operation between the proposed English-Congo line and the proposed French-Congo line, and the possible opening of new routes across the Sahara and the Belgian Congo to Madagascar, which the French and Belgian officials are promoting. There was discussion also on the matter of co-operation between the British and French lines along the Mediterranean Sea to Palestine and Baghdad with the present line operated by Imperial Airways by way of Cairo and Bagdad. The proposed French-Congo line would connect Paris to Dakar.

The third point agreed to have been included in the discussion was that of possible re-operation in the operation of the line the French now are running between Paris and the Belgian Congo via Antwerp. All present plans are originated from Paris to Dakar, on the west coast of Africa. Mail is transported by oceanic boats to Port Said, and then by rail to the Belgian Congo.

It is desired to examine further that this conference induces a fairly shared apprehension throughout England that this country may be left out of important developments in the traffic trades. A possible Franco-German collaboration has been alluded to. A memorandum has been sent for some of the important trade routes between Europe and the United States and South America being organized by way of the Americas and other points south of England and thus cutting England off almost entirely from direct communication by air.

In regard to Europe-South America airship projects it may be recalled that the German Luft Hansa is experimenting now with these Riesenflieger flying boats to be based between Portugal or Spain and South America.

Twenty-Five Finish Tour

ORLY (FRANCE).—Twenty-five of the 46 starters in the International Light Plane Tour of Europe started last August 24. Winners of the tour are to be announced later.

AN OPEN LETTER TO THE INDUSTRY

PLEASE ADDRESS ALL COMMUNICATIONS TO THE COMPANY LETTER MAIL TO INDUSTRIAL

SZEKELY AIRCRAFT AND ENGINE COMPANY



HOLLAND, MIAMI.

National Air Races
and Aerocautical Exposition
Cleveland — 1939

Airways

The organization of this Company by Mr. G. E. Szekely after eighteen years in the field of engineering research, including ten years of successful business administration, is the culmination of an ambition of long standing.

It is our principle to build the finest aircraft and engines in the small class field and to sell these products through well established, capable, and reliable dealers who are able to render proper service.

Our exhibit at the show includes the Flying Dutchman—single place low wing monoplane—suitable for advance instruction or for sport use, and the SR-3 and SB-5 motors.

We would be appreciative of your visiting this exhibit and discussing with the representatives, the sales and advertising plan through which it will be possible for you to make money with this Company's products, either in the operative field or sales field, or both.

It costs nothing to talk over a good idea and we are ready to discuss our part with anyone who is earnestly interested in a sound business proposition.

Very truly yours,

SZEKELY AIRCRAFT AND ENGINE COMPANY

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Vice President

JHD
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First open to right of Main Entrance

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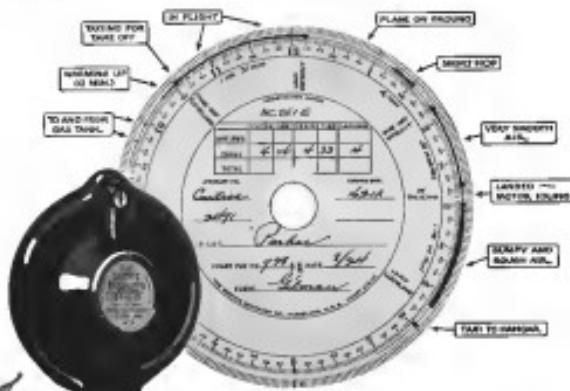
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You don't know what truly up to date sport and training plane performance can be until you have seen and flown the new Arrow Sport Pursuit. Kinner powered for 110 easy miles per hour *and more* . . . cruises at 95 . . . handles with the ease and steadiness which have made the Arrow Sport a byword among pilots for quick maneuverability and remarkable stability.

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From nose to tail skid the Arrow Sport is built with a ruggedness far in excess of Department of Commerce requirements. Pound for pound there is no sturdiness in the air—nor a safer ship for training and all around sport flying. Safer because of its structural strength . . . its proven stability . . . and the low landing speed and fast climb which take it safely in and out of the smallest fields.

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Span, 36'-0"; Max. Sectional Area, 22.8 sq. ft.; Wing area, 175 sq. ft.; Weight, 1800 lbs.; Power, Kinner R-5000, 210 h.p. at 2,600 r.p.m.; Propeller, 4-blade, 5' dia.; Fuel容量, 30 gals.; Oil容量, 4 qts.; Performance: The maximum, p. g., Cruising speed—95 m.p.h.; Take-off distance—1,000 ft.; Landing distance—1,000 ft.; Service ceiling—12,000 ft.; Maximum altitude—14,000 ft.; Maximum rate of climb—1,000 ft./min.; Maximum range—300 miles; Maximum duration—3 hours; Maximum load—1,000 lbs.

Dimensions: Maximum diameter of engine nacelle, engine dimensions, engine prop, engine, fuselage and cockpit areas, complete engine. Please inquire.

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Left: Landing gear, note especially wide and sturdy landing gear.
Top: The arrow head and the aircraft's overall profile.
Middle: The engine and add-on air-cooled radiator cooler.
Bottom Left: Two men in the cockpit, one wearing a helmet.
Bottom Right: A close-up view of the engine.

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Fair, strong and beautiful—built for those who can recognize aircraft excellence—the new Bellanca Pacemaker lays honest claim to the title "America's finest airplane." The Pacemaker is a standardized line-production plane representing all the exclusive principles of Bellanca design, with a refinement of detail and attention to present-day requirements, which once more places the Bellanca far ahead of its competitors.

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Pacemaker Specifications: Maximum wingspan 38 ft. 6 in. Maximum length 26 ft. 6 in. Maximum height 9 ft. 6 in. Maximum speed, 125 m.p.h. Landing speed, 45 m.p.h. Climbs at one level, 1,000 ft. per min. Pilot and payload, 813 lbs. The Bellanca 28-300 version in production at a weight, it performs at a high speed of 150 m.p.h. and landing speed of 110 m.p.h., payload with pilot, 1,220 lbs.



Tin Bellanca Aeroplane (28-300), shown with Wright Whirlwind Motor, standard width and all-metal rear fuselage.



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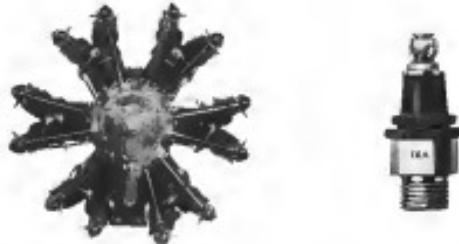
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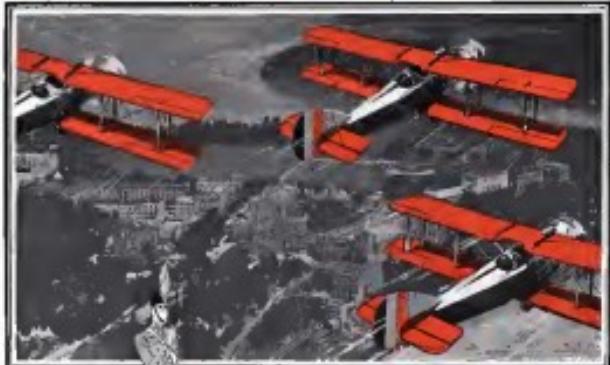
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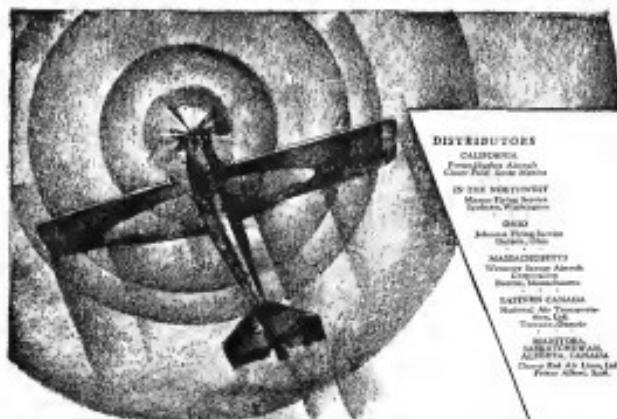
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"BIRD"

"BIRD"

Why they suit the DEALER!

Safety in Training—Speed in Transportation
DEPENDABILITY at all Times

THE MERE SELLING of a plane is NOT ENOUGH. Many times the sale depends upon instruction; often a sale is made to a newly qualified pilot. The dealer's problem is to sell the plane which will afford the quickest instruction and at the same time assure the new pilot of the highest degree of personal safety.

And again, to sell for transportation means the selling of speedy miles, ease of handling, and low cost of operation.

BIRD dealers are satisfied that their planes embody the features of ALL THAT CAN BE DESIRED IN THE FINEST OF AIRCRAFT.



"MORE PERFORMANCE PER HORSEPOWER"



PLANES

PLANES

Why they suit the FLYER!

1. Chrome manganese tubing framework.
2. Instant stability perfected to a degree which allows full-speed student training.
3. Dual control with front seat quickly detachable for passenger carrying.
4. Perfection in aeronautic design.
5. Wing design perfected aerodynamically to a degree which permits performance comparable to slotted wings.
6. Landing gear of split axle type with compression shock absorbers.
7. Metal turtle deck from front to rear allowing internal inspection.

WHEN a BIRD pilot gives her the throttle he knows that he can OUTSPEED any other ship of the same horsepower.

When he hovers over a small field he knows that he can LAND SAFELY—and GET AWAY with EASE.

When he takes a passenger—whether for hire or as a guest—he knows that his passenger is afforded the HIGHEST DEGREE OF SAFETY.

When he lands in a strange field he need not apologize for his plane, because he knows that he has just brought in the GREATEST PERFORMER PER HORSEPOWER.

Confidence and pride are manifested in the satisfaction with which the pilot regards his BIRD.

BRUNNER-WINKLE AIRCRAFT CORPORATION
17 Haviland St., Brooklyn, N. Y.





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ALTIMETERS
for accuracy of indications and
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... must check within very close limits; for dependability in the altimeter is of utmost importance in rain, snow, clouds or darkness. Every Pioneer Altimeter is carefully tested to read accurately in relation to barometric pressure, at all temperatures.

Pioneer Instruments are a mark of quality, look for them when you buy an airplane.

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LEADERSHIP

When the aviation industry was handicapped by the lack of proper insurance, it was the **INDEPENDENCE COMPANIES** of Philadelphia that first showed their faith in the future of the business by providing adequate protection against all aviation risks.

Since that date, three years ago, the leadership of these Companies in aviation insurance has been recognized by the entire aviation industry, and the leaders in the business, almost without exception, have become **INDEPENDENCE** policyholders. They realize the value of over three years of accumulated experience in this still new field of underwriting.

Now, the ability to serve their old and new policyholders, these Companies have completed the organization of their own Home Office Underwriting Department. Mr. O. M. Doyle, formerly of Los Angeles—the best known and most successful aviation underwriter of the Pacific Coast—is in charge. He and his assistants are fully qualified to act promptly on every aviation risk.

When in need of any kind of aviation insurance, it will be to your interest to look for the **INDEPENDENCE** agent or broker in your locality.

Visit the **INDEPENDENCE BOOTH** at the Cleveland Show. Learn of the new nation-wide insurance service of the Aviation Assurance Agents of America, an exclusive **INDEPENDENCE** organization.

THE INDEPENDENCE COMPANIES

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Surety Bonds • Fire Insurance • Aviation Coverages

THESE COMPANIES MAINTAIN SEPARATE RELATIONS WITH THEIR AGENTS, BROKERS AND POLICYHOLDERS

Nation's finest airport demands fueling pit service!

A prominent aviation writer, after recently visiting the leading airports throughout the country, stated that the fueling facilities of the Oakland port are superior to any in America! Some of the nine Bowser fueling pits installed at this port are shown in the photographs below.



Soon after the Oakland Municipal Airport was opened as a commercial field, all trucks were banned from the operations area in the interest of safety.

Mr. G. B. Heppert, Port Manager, has the following to say about his fueling equipment: "The pit fueling systems installed have won the favor of all pilots operating at the field and we believe that they have aided materially in winning for Oakland Municipal Airport the reputation of being one of the Nation's best managed airports."

Bowser Fueling Pits are made in various models to meet all fueling requirements.

BOWSER **AIRCRAFT FUELING SYSTEMS**

Bowser Fueling Systems have a turning radius of fifty feet—equipped with lighted walkways, maneuvering lights to be visible at night—offer an ground-based—ground-level service station—no fueling truck required—no quantities dispensed, and are especially designed to supply gasoline to which every trace of dirt, sediment, or moisture has been removed.

S. F. BOWSER & CO., INC.
1300 Croghan Avenue
FORT WAYNE, INDIANA

S. F. BOWSER & CO., INC.
1300 Croghan Ave., Fort Wayne, Ind.
We would like to know more details on
Bowser Fueling Facility Systems.

Name _____
Address _____

Viewpoint

AN AIRPORT today is considerably more than just a place for the arrival, departure and housing of aeroplanes.

The modern viewpoint necessitates individual study of each terminal, particularly to attain minimum investment, bearing in mind that today's requirements may be inadequate or obsolete a few years hence.

Our organization offers the respective viewpoints of pilot, engineer and city planner, co-ordinated for the proper solution of each airport problem.

***A. D. C. co-ordinated
service covers:***

**CONSULTATION
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**CONSULTANTS
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IGNITION CABLE ... is Vital...

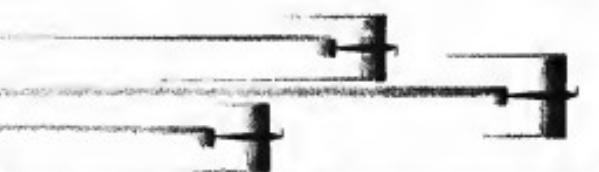


*High Tension Ignition Cable
In Airplane Service Is Sub-
jected To Terrific Abuse.
Only the Best Is Good Enough
Under Any Circumstance.*

THIS COMPANY has specialized in the manufacture of automotive cable for over a quarter of a century and is the universally recognized leader in the field.

An Aviation Division has been established to render the best possible service to this new industry. Our engineers will be only too glad to consult with you.

Address Aviation Division.

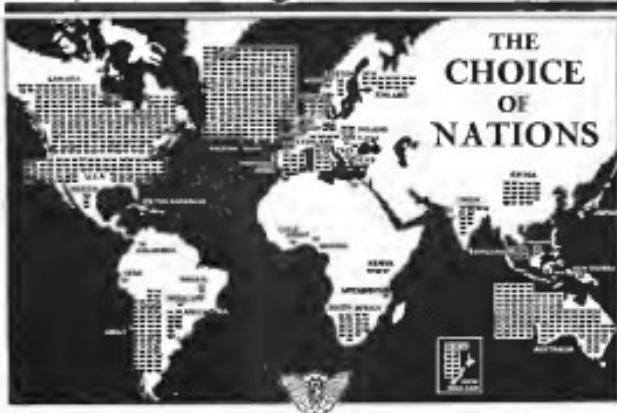


The Packard Electric  **Company, Warren, Ohio**

LARGEST EXCLUSIVE MANUFACTURER OF AUTOMOTIVE CABLE IN THE WORLD



Proved by
10,000,000
Miles of Flying



THE Moth on this world map indicates the number of machines known to be in every-day use over land and water throughout the world, either in military or naval air forces, on official government work, or for private or commercial flying. This universal choice is due to the brilliant performance of the Moth and its unparalleled

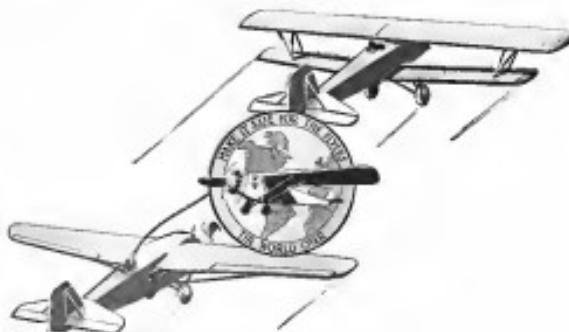
record of successes. Its reliability, economy, safety, and speed have been responsible for associating with the Moth the slogan, "The Best Light Airplane in the World."

MOTH AIRCRAFT CORPORATION

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LOWELL, MASS.

**D.H.
Gipsy MOTH**



REASONS WHY PRACTICALLY ALL AMERICAN AIRCRAFT ARE AERO SUPPLY EQUIPPED

First, because every leader in the industry knows the vital-life and death-quality of AERO SUPPLY quality in the hundreds of hidden parts of a plane—the bolts, nuts, ferrules, struts, rivets, washers, screws, shankless, threaded, hexagonal and many, many others—as well as in steel tubing, special steel, wire, cable and cabin fittings.

Second, because every AERO SUPPLY product is made in strict accordance with U. S. Army and Navy standards and specifications—and tested and proved beyond Government requirements by the highest chemical, physical and metallurgical tests.

Third, because of the standardization of AERO SUPPLY material—and the uniformity to absolute precision in sizes, thread carriage and other important details.

Fourth, because all AERO SUPPLY products have proved their dependability under every conceivable condition of emergency stress and strain—in a half million flights.

Fifth, because, operating these modern efficient plants, ample stocks of AERO SUPPLY products are always available—and “supplies as ordered—promptly shipped”—in our inevitable, recordable ratio.

Lastly, because for all these reasons AERO SUPPLY products have never—in any particular, or in any instance—failed to live up to our slogan—“Make it safe for the flies—the world over.”

AERO SUPPLY MFG. CO., INC.
College Point
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Subsidiary Companies
National Steel Products Company, Dayton, Ohio
Standard Autometric Products Corporation, Corry, Pennsylvania



The Bering
MB-2 Monoplane

Another WORLD'S RECORD *for Light Planes*

again demonstrating the
Unequaled Stamina of the
LeBLOND '60'

From Brownsville, Texas to Winnipeg, Manitoba, a distance of 1650 miles in 16 hours is a new world's non stop long distance record for light planes established by D. R. "Horsey" Zimmerman in his Le Blond powered Bering MB 3 Monoplane.

Zimmerman took off from Brownsville at 2:45 A. M. with 100 gallons of gasoline and 6 gallons of oil. Zimmerman landed in Winnipeg at 6:45 P. M. having traveled 1650 miles, beating the previous light plane distance flight by 67 miles.

In this record breaking flight only 88 gallons of gas and 4½ gallons of oil were consumed.

Leaders everywhere are turning to the Le Blond "60." Its acknowledged stamina, foolproof assembly, and easy accessibility for maintenance or repair, combine to make it the peer of aircraft power plants within its scope of applications, for student training, sport or commercial use. Write for descriptive folder.

THE LE BLOND AIRCRAFT ENGINE CORPORATION
CINCINNATI, OHIO, U. S. A.

THE LE BLOND "60" with which this new long-distance record for light airplanes was established, is the first and only aircraft engine in the entire 60 horsepower class to also meet United States Navy 30-hour test.



LEBLOND AIRCRAFT ENGINES

Most of
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at Most of the
Shows... have
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"by Nicholas-Beazley"

Airplane manufacturers and owners, airport operators, flying school operators—all look to Nicholas-Beazley as the World's Leading Aeronautical House. The answer is: highest quality products—a complete stock from propeller to tail—quick delivery—right prices—intelligent co-operation.

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Announcing

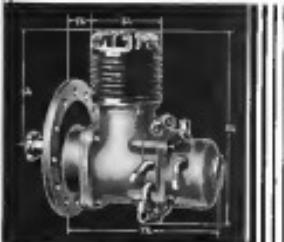


SKY SPECIALTIES CORPORATION

manufacturers of the

HEYWOOD STARTER

See our Booth No. 1394-1403 at the National
Aeronautical Exposition at Cleveland, Ohio,
Aug. 24 to Sept. 2.



Sky Specialties Corporation, which has just formed the Heywood Heywood Starter Corporation, has on its directorate some of the most prominent men in the Aircraft and Motor Car industries in the country.

Arthur L. Cohn, formerly President of Norway Motors, is President of the Company, while on the Board are Chas. B. Bohm, President of the Bohm Automobile & Truck Corporation; William J. Sturtevant, President of the Air Service, Inc., and Edward F. Roberts, Vice-President of Production, Packed Motor Car Company.

It is intended to immediately increase production to one for the ever-increasing demand, and with ample resources of manpower, manufacturing facilities, and finances, the new company is prepared to keep right in the front in the tremendous growth which this same industry will experience in the next few years.

SKY SPECIALTIES CORPORATION
3611 HAST AVENUE • DETROIT, MICHIGAN



At the Cleveland Show

Aug. 24th to Sept. 2nd

Space No. 1

Main Arena
Floor

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BENDIX

Airplane Wheels and Brakes

Adopted by

Alexander Industries, Inc.
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Etc.


BENDIX BRAKE COMPANY

SOOTH BEND, INDIANA

(Divisions of Bendix Aviation Corporation)

Announcing the Sperry AGA Floodlight

OWING to the demands of major Airports for a high powered floodlight that is efficient and dependable, the Sperry Company has designed and now has in production a 1000 millimeter, 180 degree, droptail Floodlight with the Sperry Full Automatic Arc Lamp Mechanism. Incorporated in its design is the experience gained in nearly a decade of field lighting.

This powerful floodlight not only completely illuminates the field but makes the hazards around the field stand out as if by day.

Following are some of the outstanding features of this light.

Lens: Precision ground and polished, 1000 millimeter, 180 degrees diaphragm lens manufactured by the American Gas Accumulator Company.

Housing: Constructed entirely of aluminum alloy and chromous plated brass. Two large doors permit easy access to the interior.

Ventilating System: Mocce driven, exhaust type.

Lamp Mechanism: Sperry High Intensity Arc, Full Automatic Lamp, standard for U. S. Army, 60-inch Anti-Aircraft Searchlight. A single trim of carbon burns for two hours.

Control: Can be controlled locally or remotely as conditions require.

This powerful Floodlight has been adopted as standard by Curtiss Aeroplane, Inc. See it in the Curtiss Booth at the Cleveland Aircraft Show.

Full particulars upon request.

Distributors: CURTISS FLYING SERVICE, Inc.

SPERRY GYROSCOPE CO., INC.

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The new Warner "Scarab" plant now in full operation is a model for the production of fine aircraft engines.

Completely equipped with the most modern and most efficient facilities—managed by specially trained and skilled aeronautical mechanics and engineers, the new Warner plant represents the finest in painstaking manufacturing procedure.

We believe it is fitting that the ideal light power plant should be made in the ideal factory.



610 HP 1850 R.P.M.

Weight 275 lbs.

WARNER 'Scarab' ENGINES

WARNER AIRCRAFT CORPORATION

DETROIT, MICHIGAN

The WARNER "Scarab"

Commonly performing in all parts of America, the 110 H.P. Warner "Scarab" continues its leadership as the outstanding light power plant of the industry.

This engine is invariably chosen because of its unwavering performance characteristics. For dependability, endurance and economy, the Warner "Scarab" is in a class by itself.

Send for complete literature.
Specify Warner "Scarab" if you
want the last word in a light, high
quality design.



110 H.P. 1850 R.P.M.
Weight 275 lbs.

WARNER Scarab ENGINES

WARNER AIRCRAFT CORPORATION

DETROIT, MICHIGAN

AVIATION
April 24, 1935

77



Aerial sketch of Boeing Plant 2, Los Angeles. Layout, design and construction by AUSTIN.

Airport Engineering Experience

THE United Airport of the Boeing System at Los Angeles, now under construction, is a typical example of Austin complete airport service. This organization is handling the layout, design and construction of the complete project.

Previous contracts with Boeing have included several large plant additions at Seattle, as well as hangars and airport work at various cities.

Another recent project at Los Angeles which was designed and built by Austin, is a combination factory and

hangar for Moreland Aircraft Company.

A dirigible dock for the Goodyear Zeppelin Corporation has just been completed by Austin in Massachusetts, in the record time of 30 working days.

These and other aviation projects in 40 cities from Coast to Coast indicate the breadth of this company's experience in a field where wide experience is rare.

For information on any type of airport or aviation building project, phone the nearer Austin office, wire or send the Mexico.

Visit the Austin Booth at the Cleveland Show,
No. 41-52, in the center of the Annex.

THE AUSTIN COMPANY



Airport Engineers and Builders • Cleveland
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More in The Austin Company, Cleveland — We're Interested in O'Hare (Midwest) What's happening

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THE OUTSTANDING SPORT AND

THE SAFEST LIGHT PLANE *that ever zoomed through the blue*

EACH vital point of the Avian's structure will support a load eight times as great as it will be called on to carry in normal flight.

Safety is the keynote of Avian design. It has safety in its strength... safety in its Handley-Page slotted wings... safety in its dependable Cirrus 95 H. P. air-cooled motor... safety in its amazing ease of control... safety in its wide, split-axle shock-absorbing undercarriage... safety in its slow landing speed of 35 m. p. h. . . . and safety in its entire record-breaking history.

The same efficient features that make it safe also make it sporty. With the utmost confidence, you can put the Avian through its paces, feeling that it will always do what you ask it to do.

The Avian costs less to operate than the average size automobile. It gives 20 miles to a gallon of gas, and 500 miles to a gallon of oil.

The wings fold so that the plane is only 9½ feet wide. The weight is only 875 pounds. Top weight, 1600 pounds. The price is \$4095, f. o. b. Bridgeport, Conn. Time payments arranged. Whether you intend to buy a plane for personal or commercial use, or are operating a training school, or are interested in taking a Whittemore Avian franchise for your territory, write today for complete information to Whittemore Manufacturing Company, Dept. H-5, General Office and Plant, Bridgeport, Conn.



BE SAFETY - the Handley Page wing did



WHITTELMORE AVIAN
TRAINING PLANE OF THE WORLD



FAMOUS FLIGHTS



Cylinder barrel, made from British Iron. British has manufactured thousands of these forgings during the present year for premium engine builders.

Aspinwall Shells and Fossils and their manufacture will be an especially interesting feature of Beckwith's Exhibit at the National Metal Exposition, Cleveland, September 9-12.

BETHLEHEM

AIRPLANE STEELS



FORGINGS



**MAKE BOOTHS 224-225
YOUR HEADQUARTERS**

You are cordially invited to make the Standard Oil Company (Indiana) booths your headquarters when you visit the National Aeronautical Exposition at Cleveland, August 24th to September 2nd.

We have a message to deliver which is of very definite value to everyone interested in Aviation.

STANDARD OIL COMPANY (Indiana)

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Approved Type Certificate
No. 179

performance beyond horse power-

The Horse Power of the Barling NB-3 gives no indication of its real performance.

Only the performance itself tells the story. The NB-3 has broken the World Light Plane Record for a Non-Stop Distance Flight—

sweeping 1,650 miles from Brownsville,

Texas, down through Colorado, Wyoming, and on home to California. Also it holds

the National Record for Light Planes—2,000 miles!

And, aside from light planes, the Barling NB-3 is endowed with inherent stability.

Spiral and Non-Spiral Features are en-

grained into the plane—assuring safety with-

out any doubtful mechanical appliances.

The Barling NB-3 is the only plane with a 6-Horse Power engine *designed* to carry three people—the only all-metal struts and 3-place airplane available in the United States—and the cheapest 3-place plane in the world to operate!

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Manufacturing Division — Marshall, Missouri

BARLING NB-3
Monoplane

World's Fastest Commercial Airplane USES GOODRICH SPLIT-SECOND SILVERTOWN TIRES

To fly a Lockheed is more than to fly the world's fastest commercial airplane. It is the achievement of the Lockheed Aircraft Company of Los Angeles, California.

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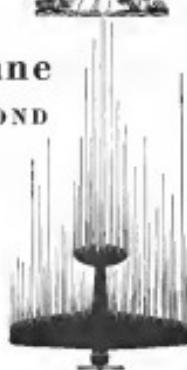


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Tire Guard—Silent-Tread—Silent Wheel—Non-Skid—Smooth Tread

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"Dawn to Dusk" Hustler Ader lie can
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Manufactured in varying capacities and designed for standard engine mountings.

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First successful two-voltage engine driven generators for single and two-way communication.

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**THE LEECE-NEVILLE COMPANY
CLEVELAND**

(Manufacturers of Aircraft Electrical Generators Since 1920)



The "St. Louis Robin" was equipped with a **STANDARD STEEL PROPELLER**



FACTS Regarding the "St. Louis Robin" Endurance Flight

Left Santa Fe July 18 at 7:17 a.m. Central Standard Time
Arrived St. Louis 10:30 a.m.

Terminated July 30 at 7:38 p.m.
Elapsed time 42 hours 21 minutes, 30 seconds.

Estimated flight, 25-30 miles per hour.

Piloting hours made 22 contacts, all of which were low winds or of position.
Used 4,000 gal. gasoline
and 150 gal. oil.
Dues Jenkins and Forest
O'Brien.

Best average performance
flight record broken by distance
of 175 hrs 27 mins.

That was the "business end" of the plane that completed this epoch-making flight—a flight terminated "by request," not by any failure of any part of the plane equipment. Engine and propeller were still functioning perfectly when the flight ended.

Increased Speed . . . Higher Efficiency . . . Greater Durability . . . Heat and Moisture Resisting Qualities . . . these are the proved factors which have made Standard Steel Propellers standard equipment on American Commercial and Military planes.

Standard Steel All Metal Propellers—first developed in 1919—may be obtained for engines rated at sixty or six hundred horsepower.

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CONFIDENCE

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"Many of the great strides forward in flying program would not have been accomplished without the aid of the Irvin Air Chute. The mechanical perfections and imperfections of all sorts of flying craft were tested to the utmost without fear of life. The increased confidence of pilots and the consequent increased skill of practical flying served to bring out more plainly than ever the unique features and value of the Irvin Air Chute. The past progress and present safety of aviation owe much to the fine construction of the Irvin Chute."

On more than 25,000 occasions, "free" test and emergency jumps with the Irvin Air Chute have proven uniformly successful. Adopted by all the air forces of the United States and by 35 other governments it now assures safety to flyers all over the world.

Infinite care and pains automatically go into the manufacture of Irvin Air Chutes. Thorough inspection of even the smallest detail and careful packing insure the perfect functioning of the Irvin Chute whenever called upon.

Irvin Air Chutes are available in all sections of the country. Among the important distributor

ties are Curtis Flying Service, Inc., The National Flying Schools, Air Associates, Inc., and National-Brealey, Airplane Co. Dealers who are interested should communicate directly with the company.

If there are no dealers near you, write us and we will arrange the most convenient way to supply your needs.

The Irvin Air Chute is available in sizes, four or five types. The small chutes are for gliders, the larger ones for gliders, the largest for gliders of the 100 ft. and 120 ft. class. The Irvin Air Chute is used by the U.S. Army with the models T-2, G-2, G-3, G-4, G-5, G-6, G-7, G-8, G-9, G-10, G-11, G-12, G-13, G-14, G-15, G-16, G-17, G-18, G-19, G-20, G-21, G-22, G-23, G-24, G-25, G-26, G-27, G-28, G-29, G-30, G-31, G-32, G-33, G-34, G-35, G-36, G-37, G-38, G-39, G-40, G-41, G-42, G-43, G-44, G-45, G-46, G-47, G-48, G-49, G-50, G-51, G-52, G-53, G-54, G-55, G-56, G-57, G-58, G-59, G-60, G-61, G-62, G-63, G-64, G-65, G-66, G-67, G-68, G-69, G-70, G-71, G-72, G-73, G-74, G-75, G-76, G-77, G-78, G-79, G-80, G-81, G-82, G-83, G-84, G-85, G-86, G-87, G-88, G-89, G-90, G-91, G-92, G-93, G-94, G-95, G-96, G-97, G-98, G-99, G-100, G-101, G-102, G-103, G-104, G-105, G-106, G-107, G-108, G-109, G-110, G-111, G-112, G-113, G-114, G-115, G-116, G-117, G-118, G-119, G-120, G-121, G-122, G-123, G-124, G-125, G-126, G-127, G-128, G-129, G-130, G-131, G-132, G-133, G-134, G-135, G-136, G-137, G-138, G-139, G-140, G-141, G-142, G-143, G-144, G-145, G-146, G-147, G-148, G-149, G-150, G-151, G-152, G-153, G-154, G-155, G-156, G-157, G-158, G-159, G-160, G-161, G-162, G-163, G-164, G-165, G-166, G-167, G-168, G-169, G-170, G-171, G-172, G-173, G-174, G-175, G-176, G-177, G-178, G-179, G-180, G-181, G-182, G-183, G-184, G-185, G-186, G-187, G-188, G-189, G-190, G-191, G-192, G-193, G-194, G-195, G-196, G-197, G-198, G-199, G-200, G-201, G-202, G-203, G-204, G-205, G-206, G-207, G-208, G-209, G-210, G-211, G-212, G-213, G-214, G-215, G-216, G-217, G-218, G-219, G-220, G-221, G-222, G-223, G-224, G-225, G-226, G-227, G-228, G-229, G-230, G-231, G-232, G-233, G-234, G-235, G-236, G-237, G-238, G-239, G-240, G-241, G-242, G-243, G-244, G-245, G-246, G-247, G-248, G-249, G-250, G-251, G-252, G-253, G-254, G-255, G-256, G-257, G-258, G-259, G-260, G-261, G-262, G-263, G-264, G-265, G-266, G-267, G-268, G-269, G-270, G-271, G-272, G-273, G-274, G-275, G-276, G-277, G-278, G-279, G-280, G-281, G-282, G-283, G-284, G-285, G-286, G-287, G-288, G-289, G-290, G-291, G-292, 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G-579, G-580, G-581, G-582, G-583, G-584, G-585, G-586, G-587, G-588, G-589, G-590, G-591, G-592, G-593, G-594, G-595, G-596, G-597, G-598, G-599, G-600, G-601, G-602, G-603, G-604, G-605, G-606, G-607, G-608, G-609, G-610, G-611, G-612, G-613, G-614, G-615, G-616, G-617, G-618, G-619, G-620, G-621, G-622, G-623, G-624, G-625, G-626, G-627, G-628, G-629, G-630, G-631, G-632, G-633, G-634, G-635, G-636, G-637, G-638, G-639, G-640, G-641, G-642, G-643, G-644, G-645, G-646, G-647, G-648, G-649, G-650, G-651, G-652, G-653, G-654, G-655, G-656, G-657, G-658, G-659, G-660, G-661, G-662, G-663, G-664, G-665, G-666, G-667, G-668, G-669, G-670, G-671, G-672, G-673, G-674, G-675, G-676, G-677, G-678, G-679, G-680, G-681, G-682, G-683, G-684, G-685, G-686, G-687, G-688, G-689, G-690, G-691, G-692, G-693, G-694, G-695, G-696, G-697, G-698, G-699, G-700, G-701, G-702, G-703, G-704, G-705, G-706, G-707, G-708, G-709, G-710, G-711, G-712, G-713, G-714, G-715, G-716, G-717, G-718, G-719, G-720, G-721, G-722, G-723, G-724, G-725, G-726, G-727, G-728, G-729, G-730, G-731, G-732, G-733, G-734, G-735, G-736, G-737, G-738, G-739, G-740, G-741, G-742, G-743, G-744, G-745, G-746, G-747, G-748, G-749, G-750, G-751, G-752, G-753, G-754, G-755, G-756, G-757, G-758, G-759, G-760, G-761, G-762, G-763, G-764, G-765, G-766, G-767, G-768, G-769, G-770, G-771, G-772, G-773, G-774, G-775, G-776, G-777, G-778, G-779, G-780, G-781, G-782, G-783, G-784, G-785, G-786, G-787, G-788, G-789, G-790, G-791, G-792, G-793, G-794, G-795, G-796, G-797, G-798, G-799, G-800, G-801, G-802, G-803, G-804, G-805, G-806, G-807, G-808, G-809, G-810, G-811, G-812, G-813, G-814, G-815, G-816, G-817, G-818, G-819, G-820, G-821, G-822, G-823, G-824, G-825, G-826, G-827, G-828, G-829, G-830, G-831, G-832, G-833, G-834, G-835, G-836, G-837, G-838, G-839, G-840, G-841, G-842, G-843, G-844, G-845, G-846, G-847, G-848, G-849, G-850, G-851, G-852, G-853, G-854, G-855, G-856, G-857, G-858, G-859, G-860, G-861, G-862, G-863, G-864, 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G-1007, G-1008, G-1009, G-1010, G-1011, G-1012, G-1013, G-1014, G-1015, G-1016, G-1017, G-1018, G-1019, G-1020, G-1021, G-1022, G-1023, G-1024, G-1025, G-1026, G-1027, G-1028, G-1029, G-1030, G-1031, G-1032, G-1033, G-1034, G-1035, G-1036, G-1037, G-1038, G-1039, G-1040, G-1041, G-1042, G-1043, G-1044, G-1045, G-1046, G-1047, G-1048, G-1049, G-1050, G-1051, G-1052, G-1053, G-1054, G-1055, G-1056, G-1057, G-1058, G-1059, G-1060, G-1061, G-1062, G-1063, G-1064, G-1065, G-1066, G-1067, G-1068, G-1069, G-1070, G-1071, G-1072, G-1073, G-1074, G-1075, G-1076, G-1077, G-1078, G-1079, G-1080, G-1081, G-1082, G-1083, G-1084, G-1085, G-1086, G-1087, G-1088, G-1089, G-1090, G-1091, G-1092, G-1093, G-1094, G-1095, G-1096, G-1097, G-1098, G-1099, G-1100, G-1101, G-1102, G-1103, G-1104, G-1105, G-1106, G-1107, G-1108, G-1109, G-1110, G-1111, G-1112, G-1113, G-1114, G-1115, G-1116, G-1117, G-1118, G-1119, G-1120, G-1121, G-1122, G-1123, G-1124, G-1125, G-1126, G-1127, G-1128, G-1129, G-1130, G-1131, G-1132, G-1133, G-1134, G-1135, G-1136, G-1137, G-1138, G-1139, G-1140, G-1141, G-1142, G-1143, G-1144, G-1145, G-1146, G-1147, G-1148, G-1149, G-1150, G-1151, G-1152, G-1153, G-1154, G-1155, G-1156, G-1157, G-1158, G-1159, G-1160, G-1161, G-1162, G-1163, G-1164, G-1165, G-1166, G-1167, G-1168, G-1169, G-1170, G-1171, G-1172, G-1173, G-1174, G-1175, G-1176, G-1177, G-1178, G-1179, G-1180, G-1181, G-1182, G-1183, G-1184, G-1185, G-1186, G-1187, G-1188, G-1189, G-1190, G-1191, G-1192, G-1193, G-1194, G-1195, G-1196, G-1197, G-1198, G-1199, G-1200, G-1201, G-1202, G-1203, G-1204, G-1205, G-1206, G-1207, G-1208, G-1209, G-1210, G-1211, G-1212, G-1213, G-1214, G-1215, G-1216, G-1217, G-1218, G-1219, G-1220, G-1221, G-1222, G-1223, G-1224, G-1225, G-1226, G-1227, G-1228, G-1229, G-1230, G-1231, G-1232, G-1233, G-1234, G-1235, G-1236, G-1237, G-1238, G-1239, G-1240, G-1241, G-1242, G-1243, G-1244, G-1245, G-1246, G-1247, G-1248, G-1249, G-1250, G-1251, G-1252, G-1253, G-1254, G-1255, G-1256, 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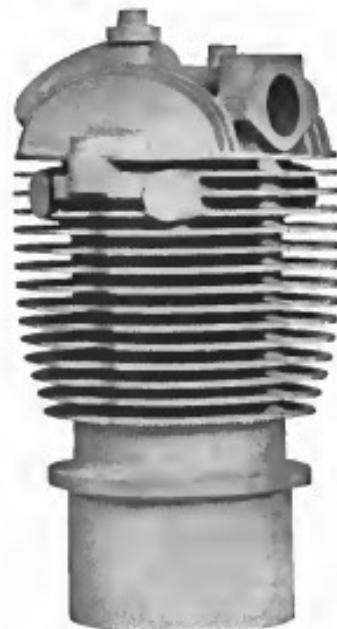
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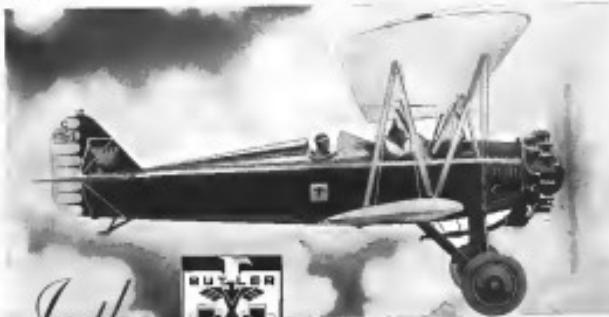
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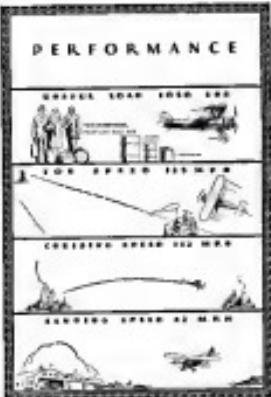
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The Detroit Aircraft Corporation is exhibiting aircraft of its make at the Cleveland Aviational Exposition, Aug. 26th.—Inset 2nd.



RYAN
The new Ryan Memphis for the record-breaking Wright 150 h.p. M. P. Wildcat Engine.

See these ships at the Cleveland Show or write the Detroit Aircraft Corporation, 3300 Union Trust Building, Detroit, Michigan for complete information.



Making * * * * * Aviation

IN 1911 the first Gruss Air Spring was manufactured for automotive use. In 1917 the first Gruss Aero Strut was placed on the landing gear of an aeroplane. The industry immediately accepted this improved shock absorber which during the past 12 years has forced numerous factory expansions. This month we move into our new factory pictured above where a staff of Gruss trained employees will start production on an improved Gruss Aero Strut.

This new strut is lighter, stronger and more efficient. It



embodies all the features that have made Gruss Struts the standard, but with refinements in design that permit far greater performance with less weight. There is a Gruss Strut for every type of ship. Let our engineers show you.

Notable among the new machines developed by Gruss engineers is the impact and recoil tester, upon which each type of strut is tested and an automatic record made of the efficiency of the assembled device. These exacting tests make possible the lifetime guarantee which covers all Gruss Aero Struts.

* * * * * History

Congratulations to the Aeroplane Industry

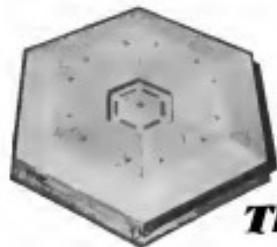
Our growth is only the reflection of the great advance made by the industry as a whole during the fifteen years Gruss has been building better shock absorbers. So at this milestone in our development we pause to express appreciation to those progressive manufacturers who have worked with us to provide better and safer landing gears for better and safer ships. We list here some of the users of Gruss Aero Struts.

Our engineering department is at the disposal of anyone desiring information on these new, lighter and more efficient aero struts.

GRUSS AERO STRUT

Manufactured by GRUSS AIR SPRING COMPANY of America
4336 DISTRICT BLVD. CENTRAL MFG. DIST., LOS ANGELES, CALIFORNIA

Aerosoft Industries
Alexander Aircraft Co.
Austin, Inc.
Bellanca Aircraft Corp.
Boulton & Paul, Ltd.
Brewster Aircraft Corp.
Cessna Motor Garage Co.
Fokker Aircraft Corp.
Joseph Kremer Corp.
McKee-Kremer Aircraft Corporation
Maximum Safety Airplane Company
Mohawk Aircraft Corp.
Monogram Aircraft, Inc.
National Steel Aircraft Corp.
Pioneer Aviation, Inc.
Protul-Airplane & Motor, Incorporated
Prudential-San Diego Airplane Co.
Sikorsky Aircraft Co.
Swift Aircraft Corp.
Theodore-McCormick Corp.
Tissue Aircraft Corp.
Travel Air Mfg. Co.
United States Navy
Valley Mfg. Co.
Waco Aircraft Corp.



The HEXHANGAR Has These Advantages

Embodying entirely new and basic principles of design, the Hexhangar brings to Airplane Transport lines and Airports new facilities for the storage, servicing and repairing of airplanes that materially reduces operating expenses, lowers overhead and reduces capital investment.

It is built entirely of steel and concrete and is hexagonal in shape. With full width doors in each of the six sides, the Hexhangar offers immediate accessibility to all planes within the building and permits the fire-safe storage of 25% more airplanes than in conventional hangars of equal area.

Our architectural and engineering services are available to responsible organizations for the design and construction of complete modern airports. Write for full information.

THE WM. EAVES CO.
1524 LaBraig St., Los Angeles, California



HEXHANGAR

Pat. Applied For

INTERIOR OF WESTERN AIR EXPRESS HEXHANGAR



At a moment of refueling

FORREST O'BRINE and DALE JACKSON
flying The Curtiss Robertson Monoplane

"ST. LOUIS ROBIN"

established a new World's Endurance Record for record flight, running constantly in the air for:

420 Hours and 21½ minutes (over 2 weeks)

powered with Curtiss Challenger Motor
and lubricated with

GULFPRADE OIL 120

This is a wonderful accomplishment for the long-distance pilot, proves the excellent reliability at both plane and motor and the perfect lubrication secured with GULFPRADE OIL.

The Curtiss Robertson Airplane Mfg. Co. desired the best oil obtainable for this flight and sent us their order for GULFPRADE OIL 120.

The oil was shipped to them promptly via express from our warehouse stock.

The same grade of GULFPRADE OIL has been used in establishing other world's records for flying power, altitude and speed and is available to all pilots. Ask for it at dealers.

GULFPRADE OIL 75 for automobile

engines for sale at Gulf Dealers and all Gulf Service Stations.

Other grades GULFPRADE OILS for aircraft, motor boats, outboard motors and Diesel engines.

GULF REFINING COMPANY, Pittsburgh, Pa., U. S. A.

DISTRICT SALES OFFICES: Boston, New York, Philadelphia, Atlanta, New Orleans, Houston, Galveston, Seattle, Portland, Ore., Denver, N. C., Fort Worth, Texas.



All the air lanes of the nation will lead to Cleveland during the National Air Races and Aeronautical Exposition, August 24th to September 2nd. The wings of achievement will glister in the sky as the bird-men form this impressive pageant of the air.

Back of the man is the machine, and back of the machine are the component industrial products, among them Glidden Finishes, a contributing factor to aviation progress since the early days of flying.

GLIDDAIR FINISHES are:

Glidden Alkydins Methylolalkyds
Glidden Flexible Linseed Oil Enamel
Glidden Casein Enamel
Glidden Phenolic Resin Enamel
Glidden Dextrin Paint
Glidden Casein Paint
Glidden Casein Enamel
Glidden Casein Paint

Glidden Lead Pigmented Enamel
Glidden Casein Lead Pigmented Enamel
Glidden Casein Water Base
Glidden Casein Acrylic
Glidden Casein Acrylic
Glidden Casein Acrylic

Glidden Phenolic Enamel
Glidden Phenolic Paint
Glidden Phenolic Resin
Glidden Phenolic Resin
Glidden Phenolic Resin

On the road to the Cleveland Airport—The main plant of the Glidden Company is one of the principal thoroughfares leading to the Cleveland Airport. During your visit to Cleveland you are cordially invited to see how Glidden Finishes are made.

GLIDDEN
EVERWHERE ON EVIDENCE
PAINTS — FINISHES — LACQUERS — ENAMELS

THE GLIDDEN COMPANY

National Headquarters

Glidden Ave., at Euclid Rd. — Cleveland, Ohio



To be good—is not enough AMERICAN EAGLES must excel

YOURS is the task of American Eagle—your first trial at the steering wheel.

For the first time in history, airplane men are the ones who will realize the risks, the thrills, the difficulties of responsibility that goes into every American Eagle. American Eagles are Super Built Airplanes, made with the realization of the obligation demanded by the name each passenger. Upon such a policy, American Eagle men have measured steadily. Glidden Finishes make the American Eagle a true flying machine. The great pilots make an American Eagle permanent within the scope of almost everyone. There's but one way to know an American Eagle—see it in flight. Come along with other pilots. You'll know then who it stands for, everything that is best in the aviation industry. See your nearest American Eagle dealer or write direct for literature.



The American Eagle Model 29 Phanton, powered with Wright Whirlwind C-160 H. P. Motor (Price \$3,300), the Wright 325 H. P. Motor (Price \$7,000); the Hispano "A" 120 H. P. Engine (Price \$2,400), or the Hispano "A" 125 H. P. Engine (Price \$2,650). All prices Flying Factory.



The American Eagle three-place biplane, powered with the Elmer K-5 Motor. A remarkable ship, priced at \$10,000, Flying Factory.



The Wilkins Triplane, manufactured by the Wilkins Aircraft Co. Inc., a division of the American Eagle Aircraft Corp., powered with Hispano K-5 Motor. Price \$2,500, Flying Factory.

American Eagle owners and prospective buyers have at their command a complete service organization, at various points, to serve the entire territory. You may also take advantage of the convenient service stations, devised for your convenience. Write the American Eagle Aircraft Corporation, Dept. A-5-16, Flying Airport, Kansas City, Kansas, for full details.

Flying territories will be open for well qualified distributors and dealers. Write or wire today for full information.

[See these American Eagle Models at the Cleveland Aeronautical Exposition and National Air Races, August 24—September 2.]



ESLINE HANGARS

the Choice of Modern Airports



Esline Steel Hangar at Vernon Airport, Inc., Newport, Vt.



Little Airport, Inc., Linton, Ohio

VIEWS OF
RECENT
ESLINE ERECTIONS



Malvern Aeromotors Co., Inc., Malvern, N.Y.

**ESLINE
HANGARS**

- 1 Low Maintenance Cost
- 2 Instantly Aspirated
- 3 Heavy Duty Construction
- 4 Easy and Advantageous to Build
- 5 Ready Operation—One Man
- 6 Simple to Extend
- 7 Complete Engineering Service
- 8 Large Storage Capacity
- 9 Short Delivery Dates
- 10 May Be Standard Tenanted
- 11 Fully Insured
- 12 Long Life
- 13 Economical
- 14 Reasonable Maintenance

In experienced owners—ESLINE should be YOUR CHOICE. 26 years of steel building experience coupled with a thorough understanding of airport requirements makes Esline the best—a Hangar which will satisfactorily fulfill every need at minimum cost.

Owners of Eslines will be pleased to point to the many advantages of their Esline Steel Hangars. Our airport engineering division will be pleased to furnish you with complete information and data. You have nothing to do now except when you buy an Esline.

*Attention Dealers: Preparation Open to
You for First Hangar in Your Territory*

ESLINE COMPANY

OCONOMOWOC, DENT A, WISCONSIN

Use
this
Convenient
Coupon!

Dept. A

Please send literature and information on Hangar cost.

Name _____

Address _____



See the Swallow T-P At the Cleveland Show

in the air—or at
the Public Auditorium

Aug. 24 — Sept. 2



Ruth Elder and the 14-ft. passenger Swallow with which she flew to cover the Women's National Air Derby.

See why Swallow deserves such popularity. See why student pilots learn faster and easier in this ideal training ship. Watch it perform daily at the field. You'll be convinced of its high safety factor. And—the price? Well that will amaze you as well as its economical operation.

"Follow the Swallow"

**THE SWALLOW AIRPLANE CO.
WICHITA, KANSAS**

This is one of a series of advertisements directed especially at advertising men to an effort to make general consumer advertising more profitable to buyer and seller. It is printed in this publication in the hope that McFerrell's advertising standards were effective in convincing us all of its absolute validity.



"They say....." buzz, buzz, buzz, buzz, buzz!

WHAT "they say" can make or break a business. That indeterminable "they" can be the most inidious force or the most helpful. In the case of Manufacturer Green "they" worked both ways.

Green* makes a high quality product that is sold through electrical stores. In sales volume he succeeded in maintaining first place for a number of years. He consistently advertised to build consumer acceptance.

Two years ago several things happened. Green lost leadership to a competitor. Earnings decreased. Stock stagnated. His dealer list dwindled . . . all of which started the inidious "they" whispering, naming, naming.

Something had to be done as salesman's morale was rapidly becoming impaired. Investigation disclosed that the real feeling in the field was that Green felt bigger than the industry of which he was a part and from which for years he had held himself more or less aloof. Emergency measures were taken to correct the situation and one year ago Green began his first trade paper advertising. He used big space and color consistently in *Electrical Merchandising*.

In this short time Green has nearly regained his old place, dealer good will of an enviable quality has been established, his salesmen set on their toes . . . which signifies that the helpful "they" are now at last working for and not against him.

*Name used in general identity.

MORAL: In selling, as in warfare, the best defense is a strong offense—and the dealer organization, which is the utility force, must be reckoned with as well as the industry.

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Detroit Philadelphia St. Louis
Montgomeryville Los Angeles



ALL-AMERICAN AIRCRAFT SHOW

Detroit City Airport and Hangar

APRIL 5-13, 1930

Approved by
Aircraft Bureau
Detroit Board of Commerce
Approved by
Aeronautical Chamber of Commerce
of America, Incorporated

The 1930 All-American Aircraft Show at Detroit promises to be the greatest event of its kind in the history of aviation. With the entire City Airport given over to the exposition—exhibits housed in the municipal hangar containing 200,000 square feet of floor space and demonstrations given from the flying fields—the 1930 All-American Show offers manufacturers an unusual opportunity to place their ships and accessories before a vast and interested public.

At the 1929 All-American Show 58 manufacturers exhibited 102 ships at Convention Hall, while 141 manufacturers of accessories participated. From advance reservations for 1930 it is apparent that the exhibits will be greater still, both in the number of manufacturers represented and the number and variety of aircraft shown. Drawings for space see to be made during the Cleveland Aeronautical Exposition.

For full particulars apply to
RAY COOPER, Manager

Suite 9032 Cleveland Hotel
AUG. 24-SEPT. 2

The Official Navy Tests
at Lakehurst Proved

FLOYD SMITH SAFETY PACK

FAR SUPERIOR TO ALL OTHER
MAKES OF PARACHUTES USED

Out of nine one drops made by navy officials from Bellanca
and J. D. Smith from the first to their last, the Floyd Smith Safety
Pack was the only one to remain quiet after opening the drop with
a load gear of 200-lb. weight.

The reason is simple: to obtain safety in fragile wire—our one
solid pack with our own cable adviser—only the excess on pack and
seams for Bellanca "Crossing Domes," for full information.

Supply your name to local distributor. Let us tell you our sales and
marketing plan.

Switlik Manufacturing Company

Factory: Trenton, N. J.

Sales Office: 360 City Center Bldg., Philadelphia, Pa.



MAKING GOOD TANKS BETTER

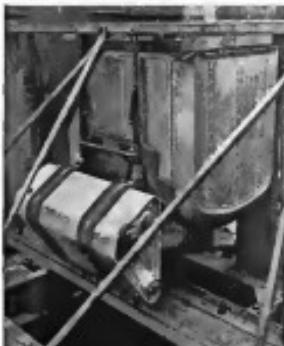
WHEN THE U. S. NAVY BUYS
fighting planes, it insists on perfect tanks... tested
to guarantee strength, durability, safety.

For years, Paramount tanks have been standard
for many Navy planes. Navy tests are applied by
Paramount Navy-standard equipment in the large,
modern Paramount plant.

The superiority of all Paramount tanks is due
in large part to the wealth of experience gained in
making better tanks perfect for Navy use.

Paramount Tanks designed for commercial use may also
be subcontracted to Navy requirements. Write for details.

PARAMOUNT
WELDED ALUMINUM PRODUCTS CORP.
185 HOBKINS AVE. BROOKLYN N. Y.
"Paramount Tanks Are Better"



The perfection of these Paramount-built marine fuel and
oil tanks is demonstrated in this Navy-standard testing
series. 2,600 pounds per minute are applied for twenty
five hours without developing the slightest leak or flaw.

PROPELLER-IZE



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Endorsed By Leading Aircraft
Industries

Aero Corp., of N.Y.
American Eagle Corp.
Alexander Aircraft Corp.
Bach Aircraft Corp.
Curtiss Monoplane Corp.
Curtiss Aeroplane Corp.
Federal Aircraft Corp.
Fleet Airplane Co.
Fessenden Aircraft Corp.
Tianan Aircraft Corp.
Auburn Engine Corp.
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Years of Continuous Service have conclusively
demonstrated

THE SUPERIOR QUALITY
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STORY CUSTOM BUILT
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Maintaining their original performance along with
exceptional DURABILITY and LOW UPKEEP.
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CAVAILER

The dawn of a new day Sales possibilities, unparalleled
in the enormous popular price field in the automotive industry,
have been opened for aviation by the "Cavailer"—a sturdy, light-
weight, compactly opposed, two-blade carbon monoplane—
which delivers proven performance at extremely low cost and
operating costs. The "Cavailer," with Volvo M-3 in its liquid
engine, delivers complete for fly-away, at \$2995. Wright Corp.
supplied engine's option, at slight additional cost.... The
"Cavailer" is in production and strongly financed. Aggressive
deals are wanted for certain areas not yet filled. Write at once
for details of superior performance and construction, pricing
information and proof of sales history.

Approved Type Certificate No. 236

Star Aircraft Co.

BARTLESVILLE, OKLAHOMA



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THE AIRPLANE and its ENGINES

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A most authoritative book on the design of aircraft engines, written by two of the foremost authorities in the field. It gives a complete history of the development of aircraft engines, from the first attempts to build them to the present day.

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The science of the flight is no mere mathematics of motion, but a science of engineering, characterized by practical application of scientific principles to the solution of engineering problems.

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by W. A. BURFORD

Whether you are a young aviator, a pilot, or a student of aeronautics, this book is for you. It is the standard text of the United States Air Force.

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This compact handbook contains all the essential information on aircraft construction, maintenance, and operation. It is a valuable reference for all who work with aircraft.

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Please send me the following books for examination: I enclose my
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"Aerovel" Mohair Fabrics

FOR the smartly upholstered cabin interior, "Aerovel" mohair fabrics are the choice of the discriminating builder of aeroplanes. Samples will be sent upon request.

The Shelton Looms

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One Park Avenue
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No Other plan of airport

lighting gives pilots the same definite, complete picture of the ground obtained with Pyle-National equipment and methods.

No other airport lighting gives airport operators so much for their money. Write for the Pyle-National bulletins on airport lighting.

The Pyle-National Company
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Pyle-National equipment is backed by more than 30 years of development, which includes power developments in airport and airway lighting equipment.

At Cleveland At Cleveland Airport
this week August 26 September 3
See the Pyle-National demonstration of airport
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GENERAL ELECTRIC SUPERCHARGERS

A Contribution to the
Safety and Progress of Flight



GE—Centrifugal supercharger

GE vaporizing superchargers are small, gear-driven, high-speed, centrifugal compressors, built-in as part of an engine, and serving the following purposes:

1. Impression in distribution.
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GE vaporizing superchargers are standard equipment on leading aviation engines.

The General Electric Company also manufactures the exhaust-driven supercharger used in all high-altitude work by the United States Army.



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General Electric Co., Schenectady, N. Y., Sales Office in Principal Cities